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FOURTEENTH ANNUAL REPORT
OF THE
ILLINOIS STATE
DAIRYMEN'S ASSOCIATION.

MEETING AT MT. CARROLL, ILL., DEC. 14-16, 1887.

"The Cow is Queen."

COMPILED BY R. LESPINASSE, SECRETARY.

ELGIN, ILLINOIS:
NEWS-ADVOCATE PRINTING AND BINDING HOUSE,
1888.

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STANDARD QUANTITY AND QUALITY OF MILK.

QUANTITY.—Borden's standard—of eight and five-eighths pound per gallon—is now taken and accepted as the standard of milk, not only in our own country, but in all Europe.

QUALITY.—The Executive Committee of the State Dairy-men's Association, after many experiments carefully made, have decided that hereafter the following shall be considered by them as the standard quality of milk in Illinois: Water, 87.5; solid, 12.5—in a scale of 100 parts.

OFFICE OF THE SECRETARY,
ILLINOIS DAIRYMEN'S ASSOCIATION,

CHICAGO, January, 1888.

*To His Excellency, R. J. Oglesby, Governor of the State of
Illinois:* •

I have the honor to submit for your consideration the official report of the Illinois State Dairymen's Association, containing the papers, addresses and discussions at its Fourteenth Annual Meeting, held at Mt. Carroll, Ill., December 14-16, 1887.

Respectfully,

R. LESPINASSE, Secretary.

OFFICERS FOR 1888.

PRESIDENT:

LOVEJOY JOHNSON,
Stillman Valley, Ill.

VICE PRESIDENT:

W. R. HOSTETTER,
Mt. Carroll, Ill.

SECRETARY:

R. LESPINASSE,
19 Michigan Ave., Chicago, Ill.

TREASURER:

J. H. WHITE,
Aurora, Ill.

DIRECTORS:

H. B. GURLER,	.	.	.	.	.	DeKalb.
D. W. LITTLE,	.	.	.	.	.	Pre-Emption.
L. M. POTTER,	.	.	.	.	.	La Fox.
E. E. CHESTER,	.	.	.	.	.	Champaign.
S. K. BARTHOLOMEW,	.	.	.	.	.	Marengo.
W. R. HOSTETTER,	.	.	.	.	.	Mt. Carroll.
LOVEJOY JOHNSON,	.	.	.	.	.	Stillman Valley.

LIST OF MEMBERS.

Adams, H. C.	Madison, Wis.
Albro, A. D.	Wayne, Ill.
Andrews & Burnap,	Dubuque, Iowa.
Bailey, O. E.	Mt. Carroll, Ill.
Bair, S. B.	Kings, Ill.
Bailey, Miss Mettie	Mt. Carroll.
Bailey, E.	Mt. Carroll, Ill.
Bailey, J.	Argo, Ill.
Baker, Andrew,	Mt. Carroll, Ill.
Baker, T. H.	Davis Junction, Ill.
Barker, J.	La Fox, Ill.
Barclay, D. F.	Elgin, Ill.
Bartholomew, S. K.	Marengo, Ill.
Beede, C. A.	Chadwick, Ill.
Beeler, Charles H.	Lanark, Ill.
Benjamin, Todd	Sugar Grove, Ill.
Bertolet, J. B.	Leaf River, Ill.
Bingham, A. M.	Jesup, Ia.
Borner, Ferd.	Big Foot Prairie, Ill.
Bowman, S.	Mt. Carroll, Ill.
Boyd, Jno.	Elmhurst, Ill.
Brown, D. F.	Batavia, Ill.
Brown, E. C.	Batavia, Ill.
Brown, H. J.	York, Ill.
Brown, L. N.	Gurnee, Ill.
Bucher, Jacob	Mt. Carroll, Ill.
Burch, F. S.	Chicago, Ill.
Cady, Alfred	Marengo, Ill.
Carbaugh, Jno. H.	Nursery P. O., Ill.
Carr, J. C.	Bartlett, Ill.
Cassidy, Frank	142 Monroe st., Chicago.
Chapman, A. P.	Sugar Grove, Ill.
Chester, E. E.	Champaign, Ill.
Christian, Jacob	Mt. Carroll, Ill.
Church, M.H.	Walworth, Wis.
Clayton, Chas.	Stillman Valley, Ill.
Cole, M. T.	Palmyra, Mich.
Cornish, Curtis & Greene	Ft. Atkinson, Wis.
Cotta, T. A.	Nursery P. O., Ill.
Countryman, N.	Creston, Ill.
Creamery Package Co.	31 River st., Chicago, Ill.
Crouse, H.	Mt. Carroll, Ill.
Curtis, D. W.	Wisconsin Association.
Curtis, M. E.	317 Washington st., New York.
Cutler, D. C.	Carthage, Ill.

Daggert, Emilie L.	Mt. Carroll.
Davies Warehouse	Chicago, Ill.
Davis, Thomas	Chicago, Ill.
Denmon, Miss Rose	Mt. Carroll, Ill.
Dillie, N. E.	Chicago, Ill.
Dresbach, J. S.	Mt. Carroll, Ill.
Dunshee, A.	York, Ill.
Dunshee, Robert	Mt. Carroll, Ill.
Edwards, Miss Viola	Mt. Carroll, Ill.
Fargo, F. B. & Co.	Lake Mills, Wis.
Finlayson, C.	Mt. Carroll, Ill.
Freeman, P. G.	Independence, Ill.
Fritz, Wm.	Mt. Carroll, Ill.
Gaines, E. P.	Naperville, Ill.
Gale, D. M.	Yorkville, Ill.
Garfield, E. E.	La Fox, Ill.
Gaston, J. R.	Normal, Ill.
Genesee Salt Co.	Piffard, N. Y.
Gibbons, Thos. H.	Elgin, Ill.
Gordon, Cal.	Mt. Carroll, Ill.
Gordon, Clary	Mt. Carroll, Ill.
Gordon, Henry	Mt. Carroll, Ill.
Graham, Robert	Mt. Carroll, Ill.
Greig, Mrs. Hugh	Oneida, Ill.
Grossman, Jacob	Lanark, Ill.
Gurler, H. B.	DeKalb, Ill.
Hadley, J. H.	Thompson, Ill.
Hallett, J.	Mt. Carroll, Ill.
Haney & Campbell	Bellevue, Iowa.
Harley, R.	Lanark, Ill.
Harrison, S. J.	Lanark, Ill.
Hays, W. M.	Chicago, Ill.
Hawthorne Bros.	Elgin, Ill.
Higgins, Dr. Geo.	Aurora, Ill.
Hinley, Mat.	Stillman Valley, Ill.
Hintze, W. H.	Elgin, Ill.
Holmes, F. D.	Owattona, Minn.
Hopkins, F. O.	Homer, Ill.
Hopkins, H. H.	Hinckley, Ill.
Horton, G. B.	Michigan Association.
Hostetter, A. B.	Mt. Carroll, Ill.
Hostetter, W. R.	Mt. Carroll, Ill.
Hoyt, R. C.	Elburn, Ill.
Inman, Whit.	Milledgeville, Ill.
Jones, W. D.	Aurora, Ill.
Johnson, Lovejoy	Stillman Valley, Ill.
Kenyon, Miss Amy L.	Mt. Carroll, Ill.
Kilbourne, C. S.	Oswego, Ill.
Knight, S. H.	Chicago, Ill.

Larkin, C. H.	Elgin, Ill.
Lazenby, Prof. W. R.	Ohio Exp. Station, Columbus, O.
Lespinasse, R.	Chicago, Ill.
Linn, Geo. W.	100 South Water st., Chicago, Ill.
Little, D. W.	Pre-Emption, Ill.
Lloyd, T. A.	Indiana Association.
Lufkin, G. W.	Beloit, Wis.
Lumbard, J. G.	Chicago, Ill.
Mason, T. A.	Joliet, Ill.
Mann, C. E.	Geneva, Ill.
March, C. H.	Taylor, Ill.
Melendy, Edna B.	Thompson, Ill.
Melendy, N. H.	Mt. Carroll, Ill.
Merchant, V. B.	Mt. Carroll, Ill.
Merrill, T. W.	Kaneville, Ill.
Metcalf, M. B.	Marengo, Ill.
Miles, O. B.	Mt. Carroll, Ill.
Monrad, J. H.	Chicago, Ill.
Moran, P. & Co.	Chicago, Ill.
Morrow, Prof. G. E.	University of Illinois.
Morton, Carl	13 Lake st., Chicago, Ill.
Murphy, R. R.	Garden Plain, Ill.
McDonough, L.	Davis Junction, Ill.
McIntosh, Dr. D.	Illinois University.
McKinstry,	Minnesota Association.
McMurtrie, W. M. Prof.	Illinois University.
Nesbitt, R. J.	Hanover, Ill.
Nycum, G. W.	Mt. Carroll, Ill.
Oatman, E. J.	Dundee.
Pape, Geo.	Thompson, Ill.
Patrick, F. A.	Marengo, Ill.
Patton, J. C.	Mt. Carroll, Ill.
Pembleton, S. S.	St. Charles, Ill.
Periam, Jonathan	Chicago, Ill.
Perry, J. H.	Geneseo, Ill.
Petty, James H.	Mt. Carroll, Ill.
Petty, J. B.	Mt. Carroll, Ill.
Poorman, Miss Emma	Mt. Carroll, Ill.
Poorman, Mrs. H. B.	Mt. Carroll, Ill.
Potter, E. G.	Minnesota Association.
Potter, L. M.	La Fox, Ill.
Reid, George	Belvidere, Ill.
Roe, D. H. & Co.	Chicago, Ill.
Rowland, David	Lanark, Ill.
Sands, O.	Chicago, Ill.
Sawyer, J. Y.	Godfrey, Ill.
Seely, Edmund	Kendall, Ill.
Seely, F.	Yorkville, Ill.
Seely, F. M.	Kendall, Ill.
Sharpless, D. T.	Elgin, Ill.
Shoudy & Miller	Rockford, Ill.
Slick, George C.	Mt. Carroll, Ill.
Smith, A. H.	Mt. Carroll, Ill.
Smith, T. J.	Mt. Carroll, Ill.

Smith, W. H.	.	.	.	Box 320, Aurora, Ill.
Sprague, F.	.	.	.	J. liet, Ill.
Stakemiller, Jennie	.	.	.	Mt. Carroll, Ill.
Stakemiller, W. K.	.	.	.	Mt. Carroll, Ill.
Stewart, Lewis	.	.	.	Plano, Ill.
Stewart, John	.	.	.	Elburn, Ill.
Stockwell, F. S.	.	.	.	Belvidere, Ill.
Stone, J. B.	.	.	.	Richmond, Ill.
Stowe, E. A.	.	.	.	Michigan Association.
Stowell, O. G.	.	.	.	Delavan, Wis.
Strickler, J. S.	.	.	.	Sterling, Ill.
Swartz, Oliver	.	.	.	Mt. Carroll, Ill.
Swigart, E. S.	.	.	.	Morrison, Ill.
Taylor, W. H.	.	.	.	Davis Junction, Ill.
Tefft, Dr. Joseph	.	.	.	Elgin, Ill.
Tenney, C. F.	.	.	.	Bement, Ill.
Thompson, E. W.	.	.	.	Sugar Grove, Ill.
Todson, A. M. C.	.	.	.	Elgin, Ill.
Victor, Birt	.	.	.	Lily Lake, Ill.
Wacker, John	.	.	.	Mt. Carroll, Ill.
Walden, W. E.	.	.	.	Stillman Valley, Ill.
Wallis, N.	.	.	.	Davis Junction, Ill.
Wamsley, C. C.	.	.	.	Polo, Ill.
Warne, John	.	.	.	Elburn, Ill.
Warsaw Salt Co.	.	.	.	Warsaw, N. Y.
Webber, C. H.	.	.	.	Stillman Valley, Ill.
Wells, Richardson & Co.	.	.	.	Burlington, Vt.
Western Dairy Supply Co.	.	.	.	Chicago, Ill.
White, F. O.	.	.	.	Aurora, Ill.
White, J. H.	.	.	.	Aurora, Ill.
Wicks, Mrs. W.	.	.	.	Mt. Carroll, Ill.
Wilke, H. F.	.	.	.	Beecher, Ill.
Willson, D. W.	.	.	.	Elgin, Ill.
Wood & Sherwin	.	.	.	Elgin, Ill.
Wolfe, Amos	.	.	.	Lanark, Ill.
Wolverton, D. C.	.	.	.	Belvidere, Ill.
Yunker, P. L.	.	.	.	Hampton, Ia.

BY LAWS OF THE ILLINOIS DAIRYMEN'S ASSOCIATION.

OFFICERS.

SECTION 1. The officers of this Association shall consist of a President, Vice President, Secretary, Treasurer, and Board of Directors composed of seven members, of whom the President and Vice President of the Association shall be members, and the President *ex-officio* chairman.

DUTIES OF PRESIDENT.

SEC. 2. The President shall preside at the meetings of the Association and of the Board of Directors. It shall be his duty, together with the Secretary and Board of Directors, to arrange a program and order of business for each regular annual meeting of the Association. He shall have power to call special meetings of the Association and of the Board of Directors, and upon the written request of five of the members of the Association, it shall be his duty to call such special meetings. It shall be his further duty to call on the State Auditor of Public Accounts for his warrant on the State Treasurer, for the annual sum appropriated by the legislature for the use of this Association, present the warrant to the Treasurer for payment, and on receiving the money receipt for the same, which he shall pay over to the Treasurer of the Association, taking his receipt therefor.

DUTIES OF THE VICE-PRESIDENT.

SEC. 3. In the absence of the President, his duties shall devolve upon the Vice President.

DUTIES OF THE SECRETARY.

SEC. 4. The Secretary shall record the proceedings of the Association and of the Board of Directors. He shall keep a list of the members, collect all the moneys due the Association (other than the legislative appropriations), and shall record the

amount, with the name and postoffice address of the person so paying, in a book to be kept for that purpose. He shall pay over all such moneys to the Treasurer, taking his receipt therefor. It shall also be his duty to assist in making the program for the annual meeting, and at the close of the said meeting to compile and prepare for publication all papers, essays, discussions, and other matter worthy of publication, at the earliest day possible, and shall perform such other duties pertaining to his office as shall be necessary.

DUTIES OF THE TREASURER.

SEC. 5. The Treasurer shall, before entering on the duties of his office, give a good and sufficient bond to the Directors of the Association, with one or more sureties, to be approved by the Board of Directors, which bond shall be conditioned for a faithful performance of the duties of his office. He shall account to the Association for all moneys received by him by virtue of said office, and pay over the same as he shall be directed by the Board of Directors. No money shall be paid out by the Treasurer except upon an order from the Board, signed by the President, and countersigned by the Secretary. The books of account of the Treasurer shall at all times be open to the inspection of the members of the Board of Directors, and he shall, at the expiration of his term of office, make a report to the Association of the condition of its finances, and deliver to his successor the books of account, together with all moneys and other property of the Association in his possession or custody.

DUTIES OF THE BOARD OF DIRECTORS.

SEC. 6. The Board of Directors shall have the general management and control of the property and affairs of the Association, subject to the By-Laws.

Four members of the Board shall constitute a quorum to do business.

The Board of Directors may adopt such rules and regulations as they shall deem advisable for their government, and may appoint such committees as they shall consider desirable.

They shall also make a biennial report to the Governor of the state of the expenditure of the money appropriated to the Association by the legislature.

It shall be their further duty to decide the location, fix the date and procure the place for holding the annual meetings of the Association, and arrange the program and order of business for the same.

ELECTION OF OFFICERS.

SEC. 7. The election of officers shall be by ballot at the first annual meeting to be held in December, A. D. 1888, and annually thereafter. They shall hold their offices for one year, and until their successors are elected and qualified. A plurality vote shall elect. Vacancies occurring may be filled by the Board of Directors until the next annual election.

MEMBERSHIP.

SEC. 8. Any person may become a member of this Association by paying to the Treasurer such membership fee as shall from time to time be prescribed by the Board of Directors.

QUORUM.

SEC. 9. Seven members of the Association shall constitute a quorum for the transaction of business, but a less number may adjourn.

ANNUAL ASSESSMENT.

SEC. 10. One month prior to the annual meeting in December of each year, the Board of Directors shall fix the amount, if any, which may be necessary to be paid by each member of the Association as an annual due.

Notice of such action must be sent to each member within ten days thereafter, and no member in default in payment thereof shall be entitled to the privileges of the Association.

AMENDMENT OF BY-LAWS.

SEC. 11. These By-Laws may be amended at any annual meeting by a vote of not less than two-thirds of the members present. Notice of the proposed amendment must be given in writing, and at a public meeting of the Association, at least one day before any action can be taken thereon.

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TRANSACTIONS
OF THE
FOURTEENTH ANNUAL MEETING
OF THE
ILLINOIS STATE DAIRYMEN'S ASSOCIATION
HELD AT

Mt. Carroll, Illinois, December 14-16, 1887.

FIRST DAY.

The meeting of the Illinois State Dairymen's Association was called to order at 2 P. M., Wednesday, December 14, 1887.

President Johnson in the chair.

PRAYER.

REV. MR. GESWICK:

Almighty God, our Father in heaven; we beseech Thee at the commencement of the services this afternoon that Thou wouldst be present with us and direct in all that shall be done. We rejoice this afternoon, while we meet together not as a political organization, nor as a religious association. We are met together here in the interests of a work and an enterprise that should enlist the hearty interest in each other and every one of us as citizens, and especially these friends who have come together from the different parts of this common-wealth, to engage in the work, now claiming the attention of this associa-

tion. We humbly pray Thee, Almighty God, that Thou wouldst give wisdom and discretion to these friends who have come together for the purpose of consulting one with another, and of stimulating one another and encouraging one another in the noble enterprise in which they are engaged. Oh, God, we thank Thee for this organization. We thank Thee that in this good work and good cause, good men and good women are devoting their efforts.

Oh, Lord, while there are so many who are uniting their forces and uniting their efforts in a cause that is evil, does it not become all those who are good and wise and true to their own interests and the community's interests, to in like manner be brought together for each other's helpfulness? We pray Thee, therefore, Almighty God, that Thou wouldst bless this convention. We pray that Thou wouldst help these earnest workers in this enterprise, that they may, when they have left this place, and gone down from amongst us, realize their efforts have not been in vain. But having encouraged each other, having learned some lessons, one from another, how better to promote their interests, they may rejoice, in having entered into our little city. We thank Thee for their presence in our midst. We pray Thy blessing upon the officers of this association and that Thou wouldst greatly bless every one engaged in the work. We beseech Thee, there may be unity of purpose to all gathered here together.

Bless us and accept us all in the name of the Great Beloved. Amen.

ADDRESS OF WELCOME.

HON. G. L. HOFFMAN, OF MT. CARROLL.

Mr. President and Gentlemen of the Dairymen's Association:

I have the honor of extending to you a cordial greeting of welcome in behalf of the officers and citizens of the city of Mt. Carroll. We thank you for having selected our little city as the place for convening the Dairymen's Association of the great

state of Illinois. By this distinction you not only confer upon us a great honor, but we also feel assured that we shall be highly entertained and edified by your exhibitions and the valuable information and instruction which you will impart. You bring together not only those who are directly engaged in your vocation, but others who will see and learn through your enterprise. The mutual advantages to be derived from the wisdom and experience of those who have given devoted attention and thought to the lifting up and advancement of the dairying interests of our state will be of incalculable worth. Higher attainments and greater results are the product of associated and concentrated effort; hence, an association of this character cannot fail to accomplish much good in enhancing and protecting the interests of your branch of agriculture. It was through such organized effort that you succeeded in procuring the passage of a law which tends to protect you from the inroads of that inimical product, oleomargarine and butterine, which was fast becoming a formidable foe to your industry. By this law not only your interests are in a measure protected; it also serves as a guard to the consumer to protect him from fraud and imposition.

It is true that butter sometimes has great strength, and at times it is typical of cowardice when it runs, but neither its strength nor its fleetness could have protected or guarded it against its spurious or adulterated enemies. It needed your succor and your protection by invoking the strong arm of the law.

The time is at hand when all branches of industry are organizing or are organized. To organize is the spirit of the age. It gives influence and strength to those who have a common purpose. It is a mighty agency which insures greater development and higher attainments. The usefulness of this association has been recognized by our legislative body, for it has seen fit to make an appropriation to aid in compiling, publishing and distributing your reports.

By your study, attention and thrift, the milk and butter qualities and quantities have been bettered and increased to a marvelous degree. Butter and cheese have become wonderful

commodities of merchandise. One of your chief objects is to improve the qualities of butter and devise better means to preserve the same and give it a golden color. I think it may be said that the use of butter and its qualities keep pace with civilization. The higher the civilization the greater is the use of butter and the finer are its qualities. We all like good neighbors, good children, good men and women, and good butter. It is in universal demand. The converse of the proposition is also true. The better the butter the better the people. At all events, poor butter finds few takers, and good butter is taken by everybody when it can be got. All over this state, in almost every community, can be found cheese factories and creameries ministering to the wants of our people. Every meal must remind us of the dairyman's efforts. You have become successful rivals with foreign manufacturers of cheese. The Switzer and odoriferous Limburger must give way to our domestic products, which are more palatable and less offensive to the American olfactory.

You have for your motto, "The Cow is Queen." You will find this queen on all these fertile farms around and about us, you can see her graze on the prairies south of our city or on the hills and in the valleys on the north; I may add that corn is king in this section of the state. On every side of our city you behold this king and queen. Does this not explain why you have selected this city as the place for convening your association to do good in this rich and prosperous section of our state where this king and queen go hand in hand? This country flows with milk and is enriched with corn. I have heard it remarked that venders of milk do not always strictly comply with the rules of ethics, especially when the quantity of milk is insufficient. It is often made to mingle with its weak associate in order to increase its supply. This the consumer abhors, for milk and water people are not much sought for in your business, and I have no doubt this association would regard such practice a vice.

When we invited you we knew upon which side our bread was buttered, and from the exhibits of butter I have seen I am satisfied that there is a sufficient quantity of gilt-edge butter in

the city to permit you to butter both sides of all the bread you may eat during your brief sojourn with us. One kind of milk I am sure you will find in ample quantities, whether you stop at our hotels or our homes is the milk of human kindness. I trust that you will learn that the citizens of Mt. Carroll are not oblivious to progressive movements, and that you will be satisfied with the encouragement they shall give you, and with the hospitality they may manifest, as they feel fully rewarded and highly compensated by your visit for all they may do towards making this convention a success.

Let me say again that you are heartily welcome, and that we anticipate both a pleasant and profitable time while you remain with us. We hope that you may continue in the grand work for which you have organized, and that you may advance with unfaltering success. The best wishes of our people are with you.

RESPONSE.

SECRETARY R. LESPINASSE:

MR. HOFFMAN—You have said welcome, welcome to the dairymen of Illinois, and these words are like an echo of that kingly welcome in deeds which the entire population of your pleasant city has taken special pleasure in extending to every visiting member of this association.

And now, my friends, with you who are proving such hospitable and amiable hosts and hostesses, we hope the estimate you have placed upon your guests will not prove disappointing, and the coming of the Illinois dairymen to your town may serve your residents with cause for congratulation.

Under the present circumstances may it not be allowable to present the guests to the host, that they may become more intimately acquainted with each other.

In the natural course of affairs the energetic and intelligent man whose occupation brings him constantly in contact with the wonderful and powerful main-springs of animated nature cannot fail to become imbued, with a keen faculty of observation to

appreciate the noble work, the improvements and hidden beauties of nature. With alacrity he will bring to bear all appliances devised by inventive genius, tools wrought by deft hands, discoveries brought forth by wise and learned scientists to materially advance his interests and proficiency in his calling. He will prove an apt pupil and be a close student thus improving and embellishing his own nature, mentally and morally.

"Beauty is only skin deep," but alas, mankind is more given to top dressing than to the solid treasures beneath the surface. Not so with the Illinois dairyman. With him "handsome is that handsome does;" the performances of the gentle, lowing cows, the sprightly dairy maids, the dairy attendants, the men and women of the dairy farm, each and every one, singly and collectively, are valued for intrinsic merit, rather than fine looks or fine plumage. The civilizing influence of the dairy which has been forcibly brought to public attention within a few years hovers over him.

Progress is one of the necessities of civilization, hence progress in dairying is an urgent necessity of civilization. It is more a question of brains than of muscle; heads are better than hands; intelligence is more productive than mere hard work. One-fourth the old-time labor now accomplishes double the old-time result. This dairying industry is fast taking its place among the exact sciences; its extensive adoption is a huge advance in the career of intelligent improvements; its magnitude is such as to attract whatever chemistry, science, mechanics, can supply to make its operations perfect and render its rewards certain.

Material progress can be the results of only a higher education. This is especially true of the dairy in Illinois.

Let me say right here—and I have thought a good deal about it—let me say right here to you, friends and neighbors of Carroll county, the successful dairyman is he who mixes the rations of his cows, takes care of his milk, and looks after the details of his butter-making with brains.

The representatives here with you are of this stamp and

character—they are Illinois dairymen—and among the polity of these vast and glorious United States, Illinois stands as the dairy star in that immense galaxy of stars. First and foremost with her stock and her products, in renown, experience, quality and profits. Almost alone among the states of the central and western sections of our country, can Illinois show a profit on every herd of cows within her borders derived from the value of her dairy products. Over \$35,000,000 for one single year. Figure the immensity of such an interest, then the sweet morsel, around and again, under your tongue—where is the other single interest in this state?—for it is only Illinois we are considering now, Where, I say, is any single interest that can overtop this in return? No going behind any Returning Board with \$35,000,000. Eight figures to express it. Does any one wonder now? There is nothing small about the Illinois dairymen and no abiding place for flies can be discovered upon his person.

But, ladies and gentlemen, it takes a more experienced voice than mine to tell you how distinction has been won and the place of the state kept at the front rank of the dairy columns.

At best, I could only explain to you in an honest way, how the reputation of Illinois butter ranked among the finest from time immemorial. How in 1840, Mrs. Steele, an eastern lady, upon a course of western travel, and we stand ready to maintain her ability to judge rightly and impartially, wrote from Peoria :

“The butter and milk we met with here was uncommonly rich, equal to our Goshen butter.” And Goshen butter was some pumpkin those days.

How the scope and extent of the industry grew a pace with the gradual influx of population westward; how improvement in apparatus, and men and women as well, influenced that wonderful increase in products I need not mention; for it is only to this that the virtual growth in the amount of animal production comes to. Value per pound has changed but little in forty years. A pound of butter or a pound of cheese will not average in value for 1887 much more than it did for 1847 or 1857—thirty or forty years ago.

In 1850, an Illinois historian wrote: "The dairying interest of Illinois must doubtless be very great. The value of the butter and cheese of Illinois annually is \$1,675,000; each cow producing on an average for her owner about \$5.50. Butter in the Chicago market averages about 22 cents per pound. Cheese usually sells for from 8 to 12½ cents."

The product of the dairy cow of 1850 in Illinois is discounted more than ten-fold by the cows of 1887. Here lies the true explanation—the exact reason for the wonderful figures we are able to bring forth to-day through painstaking efforts and years of plodding, breeding and study, the dairyman of '87 has changed the conditions and capacity of the *great and only* original butter machine, the Queen Cow.

A single statement of facts about the experience of men who have followed the path of dairying earnestly should certainly be sufficient to satisfy anyone interested enough in the matter to stop and figure a moment that it must, as a matter of course, take the lead in sections of the country situated like this, where land has become valuable and soiling should be a rule instead of an exception. After figuring the value of the actual products of the dairy, if you will add to it \$39.00 for every one thousand dollars sold, which amount represents the difference of loss to the farm soil between selling \$1,000 worth of beef and \$1,000 worth of butter, and a further addition of at least \$7.00 per cow for the annual product of manure; with a reasonable amount for the value of skim-milk in making pork, you will arrive at a more legitimate estimate of the value of the dairy. And the reason for statements from well informed correspondents that "dairying is at a low ebb in this section" will soon have no reason to exist, for it is only natural to suppose, that you, my hearers, are intelligent men, and stand ready to adopt any system of work that will bring to you better and surer profits, especially so when you can reason it and figure out for yourselves.

It is only a few years since the wheat crop was considered the criterion of civilization of the country and King Cotton was

supposed to hold his scepter without contention, but to-day the little messes of milk from the various farms of the United States turned into dairy products aggregate in value for the year ending July 31, 1887, after an unprecedented drouth in the most productive butter section of the country the enormous sum of \$564,965,900. Four times the cotton crop and exceeding the wheat crop over \$150,000,000 in value. Who will now gainsay that the cow is queen?

The influence of the west on the butter product of the country is better shown by the fact that the sales on the New York market as reported by the exchange show one-half more of western butter than eastern butter. Another significant fact is that the value of the dairy products handled in the year 1887 on the New York market amount to \$43,000,000—not much more—if any at all, than the amount handled in our own city of Chicago, in our own glorious state of Illinois for the same period of time.

In the temple of memories dear shall we treasure this gracious welcome to the end of days. And when called to answer at the mansion above, the formal welcome of St. Peter at the gate of Paradise will only serve to re-awaken the tingling echos of your kind, hospitable and hearty welcome to Mt. Carroll.

PRESIDENT'S ADDRESS.

PRESIDENT LOVEJOY JOHNSON:

We may with propriety congratulate ourselves upon this auspicious opening of the Fourteenth Annual Meeting of the Illinois Dairymen's Association.

The most modest of men relish flattery sometimes. After such a hearty and flattering reception to this beautiful city so eloquently given by your mayor, I trust we may be pardoned if some of us in talking of our calling and the magnitude of it, and how necessary to commerce and the well-being of society an intelligent, educated dairyman is, we should appear like a mutual admiration society.

We are gathered here from our farms, our factories and our offices, not to have a jolly, good time merely, not to ventilate any pet notions, or cranky ideas with which any of us may be afflicted, not to forward the interests of any special manufacturer or to boom any special breed of live stock, but as members of the association to compare notes and experience, anxious to learn all we can and willing to tell what we know.

If there is anything new about making or marketing dairy goods; if there is anything new about managing a dairy cow, or a farm, we want to know it.

When we look back but a few years, even within the memory of the youngest here, and see in what a primitive condition the dairy business of our state was in when creameries and cheese factories were unknown; when the milk from cows fed on wild hay in winter and wilder grass in summer was set in tin pans, skimmed with tin skimmers, the cream churned in dash churns, the product misnamed butter, traded to the grocer for goods without any special regard for value; when we compare the past with the present, we are astonished and satisfied that the *dairy world, at least, does move.*

We expect papers upon some of the most important subjects, but these papers, however elaborately prepared, should be but the prelude to an exhaustive discussion of the topics suggested. Often a hint or a question from a practical dairyman will "lighten up" a subject wonderfully. It is to be hoped that every member will contribute his share.

During the year we have passed through the most trying season of our experience. But the terrible drouth which a year ago nearly ruined the corn crop and greatly reduced the yield which in June and July of this year looked so promising; which has advanced the price of feed to double that of late years, may yet teach us a lesson which, if thoroughly learned, will lead to valuable results. It is not wise to interpret *every storm or calm* as a special dispensation to suit our individual circumstances. Yet in this case I cannot resist the conviction that this long continued drouth, though for the present seem-

ingly disastrous, will prove to be a *special providence*. As the chintz bug put a stop to wheat raising in northern Illinois and Iowa, delegating it to the more western and newer states, so this drouth has checked the excessive and unnecessary production of certain cereals and taught us the value of others. In other words that corn-fodder is cheaper, and if properly secured is a better milk producing ration than the timothy of old.

The great question for dairymen to-day is: How can we cheapen the production of milk? Unless we can make an acre of land worth seventy-dollars in Illinois produce more than the same ground in Nebraska that is only worth ten dollars the dairy business must "go west," and that very soon too, we shall be in the position of our New York and New England brethren who are begging us not to ruin them.

The reputation of our goods will not always make us money enough to compensate for the extra cost of production.

If then we find a substitute for the expensive cured grasses our close proximity to the eastern consumer will always give us the advantage.

In order to awaken enthusiasm and give instruction upon this subject the directors have wisely provided for a thorough discussion of the topic of ensilage during the session.

The subject of bogus butter comes before us in a new form this year. The manufacturers of this fraud, it is claimed, are compelled to pay the tax imposed upon the retail dealer for his license. This with the two-cent tax makes a burden grievous to bear, and they are already moving upon our law-makers with petitions, etc., under the pretext that they want the law amended by reducing the tax and removing the license of retail dealers. A close observer cannot fail to see under the half-hearted enforcement of the law incalculable good to the consumer as well as the producer of genuine butter. To be sure the butterine men have not been able to manipulate the price of gilt edged butter. There have been fewer *booms* in the market, but dealers and fair minded producers will say that prices have been *reasonably* high, and best of all, any man rich or poor need

not be imposed upon. He can *know* what he is eating. And yet we find *some* among our own number who are ready to sign these petitions. The dairy interest should beware of their specious arguments.

The *repeal* of the law is what they really mean, and will have unless there is a strong and united effort to prevent it.

I take it this association should take strong grounds against any change whatever in the law.

This association should ask from the state an appropriation sufficient to carry out some system of instruction, whereby a better knowledge can be obtained of how to produce the greatest growth in stock, and the greatest quantity of milk from the smallest amount of feed as well as the *mysteries of fine butter and cheese making*.

In my judgment we have been too modest in our requests. Ten thousand dollars would be nearer the sum we need than five hundred.

This sum might be well spent in holding county and township institutes.

If the state were districted and a competent salaried superintendent who combined with the knowledge he may have acquired at an experimental station, a reasonable amount of practical knowledge of the advanced dairying placed over each, the good results would be very soon apparent. In this connection, would it not be in place for this association to urge the newly-formed association of agricultural colleges to spend a good part of the \$10,000 appropriation upon the experiments connected with dairying.

When these things are accomplished and the farmers of the central and southern portion of our state see that there is indeed *money* in the business, will Illinois take her place where she belongs, as the first dairy state in the union? Then instead of the quotations we now see in New York market, *Fancy Elgin, 32c*, other brands 25c to 30c, Illinois goods will outsell the world.

An industry closely connected with and of vital importance to it is *hog* raising. The fearful losses which our section has suf-

ferred from the ravages of that frightful scourge, *hog cholera*, demand more than a *passing notice*. The peculiar feature about this disease is that its symptoms are so varied that our wisest veterinaries have failed to agree in the diagnosis. As a result, *quack doctors* and cholera cures are found on every corner and drug store.

Would it not be well for this association to unite with the various breeders' association of the state, in urging the appointment at an early date of a commission competent to investigate and determine the cause, and, if possible, a cure, before the magnificent herds of our state, of which we are justly proud, become extinct—a thing of the *past*.

On motion of A. B. Hostetter, a committee of three, consisting of the following named gentlemen, were nominated, to take into consideration the president's address:

Committee on President's Address—A. B. Hostetter, of Mt. Carroll; Jacob Grossman, of Shannon; D. W. Little, of Pre-emption.

Committee on membership was appointed by the president as follows: James Hallett, Elijah Bailey, John B. Petty, S. J. Harrison, George Hadley, C. F. Tenney.

REPORT ON OLEOMARGARINE.

THE SECRETARY:

Mr. President, Ladies and Gentlemen, and Members of the Association—It is not my intention to bring any elaborate article or paper upon that subject, but simply to call the attention of the association and of the butter makers and consumers of the country, to the situation, the exact condition of affairs at the present time on the question of oleomargarine.

As most of you are aware, one year ago last November, the national law upon the subject, representing merely the power embodied in our national legislature, went into force. A tax upon imitation butter products was levied.

After one year's experience with the working of the law it

has become evident to every farmer who owns a cow, every man who makes a pound of butter, every man who has to depend upon the markets of the country to run off his products, that the oleomargarine law has been a blessing indeed. I will give you only a few figures, though there could be hundreds of statistical tables brought to your attention.

In 1885 and 1886, the average price for all grades of farm dairy butter throughout the United States, did not exceed 8 to 9 cents per pound. The oleomargarine law went into effect in 1886, and the average price of dairy butter for 1887, is according to the best information, 21½ cents per pound. In the state of Illinois alone, my friends, this makes a difference on the products of your farms, of your farm dairies, remembering that we do not include creameries at all in this estimate, it makes quite a difference and the figures show that Illinois farmers are richer, because of the operation of the oleomargarine law in the year 1887 by more than \$7,000,000.

It had been my hope that we would have here to present this question a man who has been a war horse in this matter since the beginning of the contest.

I expected to introduce here this afternoon, Col. R. M. Littler, secretary of the National Butter and Egg Association, who has devoted a number of years to the close contest, and you might say arduous fight, upon this question before our National house, also the legislative body in Illinois.

I hold in my hand a letter from the Colonel which I will read to you:

*"Dear Sir—*The attack on the dairy interests has opened at Washington. As I will have many letters to write and other matters pertaining to my duty as secretary of the National legislative committee, I will be compelled to absent myself from your state convention. I would much like to have been in attendance for I know you will have a good crowd and an instructive meeting. I trust you will not adjourn until the Association has declared itself plainly on the proposition that the bogus butter manufacture and sale must be regulated by *State*

and *National Laws*, and also that dairymen and friends of the dairy and agriculturists have *no use for or sympathy with* those who truckle to the money power of the *butterine gang*, and who would destroy the *dairy interests* to advance their personal end. With \$.480 *license to sell* instead of forty-eight dollars per annum, the butterine gang would start the four thousand retailers in Chicago to supply the million consumers, and the same thing done in other prominent distributing points, the dairy interest of the entire nation would be annihilated. The slaughter house dairies of Chicago and the northwest can turn out three hundred million pounds of the truck, and when the east, without cotton and the cottonseed oil, etc., are counted in, where shall be the dairy?

Yours, with wishes of a successful meeting,

R. M. LITTLER."

The situation to-day is about this: There is a national law passed by congress, in the exercise of their prerogative, and the congressmen of the United States have simply done all they could do. There is only one thing that it is in their power to do and that is the power of taxation. The power of regulation is one that remains with the state, and to the state, we must turn for whatever relief we find necessary. National legislation, as far as it has gone, and as far as it can go, is very good, but without state legislation, it leaves the door of fraud still wide open.

The butterine men have addressed to every congressman and senator of the United states, a brief upon the oleomargarine question. This brief is quite voluminous and in it are contained some most subtle reasonings, some of those candid statements which by right pertain to an honest man, but which the rogue can also use to advantage when cloaked with a mantle of hypocrisy. The apparent object is to get a revision of the law as it now stands. If that revision of the law is entered upon by this next congress, it is very hard to tell where it may end.

One of the phases of this contest for which we have cause of congratulation is the position occupied at the present time by

the lard sellers. The National Butcher's Union of the United States have discovered that lard cannot be sold simultaneously under two heads, and could not very well be sold for butter and sold also for lard. They discovered, after taking a long while to make the discovery, that they had been buying and selling for a number of years, cottonseed oil, tallow, and other compounds of miscellaneous and somewhat doubtful character for pure leaf lard. They have reasoned in their minds that such a condition of affairs is hardly honest and seems a downright imposition on the customers, and they are at present knocking at the doors of congress with petitions asking that a law similar to the oleomargarine law, placing lard under control of the internal revenue department, and under a tax, be passed at the next session of our National Legislature. This is help in a direction which we little expected.

But on the other hand I must say to you that at the late meeting of the National Cattle Grower's Association of this country in Kansas City, attempts were made to place upon its records at various times during the session, resolutions to the effect that as a body they should call upon congress to repeal the oleomargarine law and condemn any attempt at taxing that spurious compound. A strong fight in committee brought out a compromise resolution censuring the Illinois State Board of Agriculture for refusing oleomargarine a place in the Chicago show, and it was found impolitic to go further. This is a little less than welcome at the hands of those whom we had always thought should be with us and remain with us. Let me say to you, ladies and gentlemen, that there is a misconception in this matter, grown up from statements circulated through this country broadcast, that the attempt to regulate the sale of oleomargarine in this country, was a terrible blow directed against the interests of the best stock breeders and feeders of the United States. It is a misconception, it is an error, it is a glaring and foul falsehood. There are no two interests in this country, or any other, that should go hand in hand and remain united more

than beef-growing and milk-raising. I make that assertion boldly, and am ready to sustain it with fact and figures.

In this fight before our National legislature, in this fight before the consumers of the country, the grand army of the dairymen stands like a corps without a leader. They are scattered through the four corners of the earth and in every direction and in every way powerful if they could become united. If united, there is no element, no power, that could resist their influence, but as it is, they are so estranged from one another that the individual efforts put forth amount to almost naught. Thorough organization is absolutely necessary and it is for your consideration, with that object in view, that these remarks on the oleomargarine question are presented.

The situation is now one of constant fight; it is a systematic and continuous fight to be carried on and kept up to the end. It is only by adopting strictly business measures the question can be fairly met. This meeting together at times opportune and inopportune, discussing the question for a few moments, resolving that we will do something and when we leave the door it is entirely forgotten and laid upon the table until another year comes around, will never solve the oleomargarine question. Certainly not as long as there are on the oleomargarine side none but men who pride themselves in being calculators, figurers, business men.

On the one side it is men without organization, who could, if they get together, accomplish much, but have not seen fit to do so up to this time. Organizations have been attempted, but they have no valuable results to show on account of the indifference manifested and the small numbers enrolled. It has almost been an impossibility with the work heretofore done by this association in Illinois to bring any influence to bear upon our state legislature. On the other side there are a dozen, yea, a half dozen men, powerful in political and monetary influences, who calmly and deliberately stand by their million-dollar bags and fire broadside volleys into the ranks of the dairy people. This is exactly the position in which the dairymen of the United States

are placed and especially, the men of the state of Illinois in regard to the oleomargarine question.

We have had to fight for what we have got, and now we have to fight to keep it. It is a necessity, and an absolute necessity that our association should take such measures and devise such means as will bring this matter to the attention of our state authorities, that something effective may be done by the next legislature of Illinois to give the dairymen of the state, who are certainly entitled to it, representing as they do, the most important productive interest of the state, the relief which they so much need, and have needed for so long. In our contentions for this righting of wrong and perfecting such measures as will secure justice and equity for all parties concerned we must not lose sight of a tendency to take narrow and partial views of truth; a tendency to exaggerate and make random statements.

Disproportion has been a capital mistake. Exaggeration of small things; neglect of weightier ones; want of perspective in judgment; amplification of technicalities and little attention to any germane or allied interests in the solution of the question, are errors to be shunned and avoided. It is a very bad thing to fall into the vice of disproportion. It robs utterances of all their power and such words are as an idle tale in the ears of discerning men.

The real issues of this question at this day are far more profound and vital than those over which most of the noise is made. They bring into play the greatest points of political economy and involve the fundamental principles of our governmental organization as a Republic, one and indivisible, created for the best interests of the masses and administered for the people and by the people.

As producers we do not urge that any of the questions now in prominence be disregarded. We ask that they have the attention that rightly belongs to them and no more; we ask that thoroughness characterize all and every proceeding that may be necessary to arrive at a complete solution of this question, which, under its present legal status is neither more

nor less than a recognized right to adulterate, under certain conditions, restrictions and formalities. We urge that no haste be manifested on the part of our United States officials to make public prognostications indicating a leaning to give the oleaginous compounds mixed in semblance of butter a place among the legitimate articles of food merchandise of the country. We call for a present halt, that light and truth, without prejudice or favor be let in upon the subject.

We do not plead for the omission of any truth; we only ask that truth be rightly divided, and that the emphasis of our censure be put where it belongs. We do neither ask nor expect that the scales of blind and inflexible justice be deviated from the true course. But after the most searching investigation—after laying bare all the good and the evil, the truth and the falsity, and sorting the wheat from the tare, we purpose to ask, nay demand, that the legislators whom the people will select to represent their views and wants in our state legislatures, shall do their duty, their whole duty in these premises and give the Lord, as well as the devil, his dues.

It is too late to resist the beginning. The battle is on us, and the simple question is where the onset is heaviest, and where the line is weakest. That is where the good soldier wants to be. That is specially where the dairymen of Illinois have to be.

DISCUSSION.

The President: "It is the custom of this association, after a speaker has finished his address, to have him remain on the platform open to the shots, the questions and remarks of any and all individuals who choose to fire at him. Now, what have you got to say to the secretary, or to ask him?"

Mr. Halleck: "Mr. President, he says that according to the law, we can know what we are eating for butter. I have been to Chicago two or three times and have eaten in several restaurants, and did what I could by smelling and tasting and inquiring to find out what I was eating for butter, and I confess

I have no idea at all whether it was butter or butterine and came home without finding out."

The Secretary: "I am pleased the gentlemen has brought out this question. The legislature of the United States, our National congress, possesses only delegated powers. The power delegated to our National congress is merely and simply the power of taxation. They can impose a tax upon an article, but after they have done that, they have gone as far as their power lies. They cannot even oblige the same body which imposed the tax to provide means for the collection of that tax outside the regular machinery of the proper department. It has been an idea current among the people that if we could only get a National law passed regulating the sale of oleomargarine, we would immediately get relief for all our ills. It is not so. The law passed by our National legislature goes as far as all demands upon them can bring it, but still it does not regulate any further than the regulation by the internal revenue department; that the tubs and pails shall be stamped from the hands of the manufacturers, to the hands of the retailers, and that the retailer shall put his card and notice upon the packages that he delivers to consumers. There ends the power of the National legislative. Here the state legislature's power commences and is alone the power that can give you absolute relief. It is only the state of Illinois, in its legislature assembled, that can declare and say that it shall be illegal for any restaurant keeper, hotel keeper, retail dealer, manufacturer, pork-packers, or anyone else in the state of Illinois, to mix or sell oleomargarine or offer it to eat as or in lieu of butter and oblige them to conspicuously placard their places of business to the effect that a thorough advertising will be given to the fact that oleomargarine is sold or served there."

The President: "What is the law now?"

The Secretary: "The law of Illinois as it stands to-day is a good law enough if there was any practical way to enforce it. The law of this state to-day reads that neither oleomargarine or any other compounded or spurious food shall be sold by a retailer unless he shall give notice to the purchaser that it is a compound;

that that compound contains so much per cent. of this, that and the other. But, gentlemen, we have a big stack of laws on the statute books of Illinois. A great many of them are in force and a great many are not, and unfortunately, this is one of those that perforce remains a dead letter, for the simple reason that when a noble legislature so liberally passed that law and gave that grand relief(?) to the people, they neglected to make any provision whatever for means to enforce the law.

A majority of our previous Illinois legislatures have appeared entirely unaware that there is a dairy interest in Illinois capable of demanding attention; that it is one interest in the state representing more than any other. The dairymen of Illinois are not and have not been politicians. The time is now surely at hand for them, as a matter of vital interest and self-protection, to take such steps as will purge our representative halls from men deaf to the demands of producers and consumers, but with ready ears and open palms turned towards the monopolists, adulterators, and leeches of the community.

Mr. Bailey: "I would like to ask you if the two-cent tax on oleomargarine has decreased the manufacture or sale of the product?"

The Secretary: "The sale has decreased about seventy-five per cent.; it is said to be to-day less than thirty per cent. of what it was one year ago last November. But there is more than one cause for this; we must not give the law the entire credit. It is not the National law alone that has caused a lack of demand for oleomargarine, but the fact that it has been shut out from a number of states whose legislatures went to the succor of the people. In New York, Pennsylvania, Minnesota, Missouri and Ohio, they entirely interdicted the sale of oleomargarine and consequently that field is entirely shut out, a sealed book as it were for its manufacturers, and it has been impossible for them to carry on trade in those states. This is one of the reasons which have operated in causing the diminution of sales to a great extent. It would be safe to say that the action of the National law alone would probably have decreased

the sales of oleomargarine from twenty-five to thirty per cent. It is only in our markets that the compounders have an open field, the majority of the other states where large centers of population exist having entirely closed their doors to the compound. That is the reason why the sales of this concoction have decreased so largely. They have been shut out in eight or nine states where its consumption was greatest."

The President: "I am glad that question was asked, because we see it often stated in our public prints by the manufacturers of oleomargarine and butterine that there has been more sold during the last year than any previous year, but I think those statements are without foundation; as near as we can get at it, there is about thirty per cent., perhaps a little less than thirty per cent. I feel grateful that we have got a United States law, and would be very glad if we had a state law in regard to it."

Mr. Hostetter: "I want to ask a question in regard to the action of the National Cattle Grower's Association. Did the resolution that they passed ask for the repeal of the law?"

The Secretary: "I have the proceedings here in my hand and will read the resolution, which was unanimously adopted:

WHEREAS, All that the dairymen have in the past asked was that oleomargarine and all substitutes or imitations for butter offered for sale should be required by law to be so offered in real character and under its true name; and

WHEREAS, We now have a law to that effect; therefore, be it

Resolved, That the prohibition of these substitutes for butter from exhibition at the fat-stock show is a discrimination against the products of fat stock not asked for by intelligent and fair-minded dairymen, and we respectfully ask that such discrimination be discontinued.

That is exactly, gentlemen, where the action of the National Cattle Grower's Association tried to force the hand of the Illinois State Board of Agriculture in doing that which any man in the state knows, if he is intelligent enough to read, would be detrimental to the dairy interest of the state.

In addition to that, the Sangamon County Breeders' Associa-

tion of Illinois, of which Mr. De Witt Smith, the president of the Cattle Growers' Association of the United States, is the great shining light, put on record, a resolution still fiercer than this, coming roughshod upon the Illinois State Board of Agriculture, almost as much as saying: "We will put the knife into you and you will admit oleomargarine into that building and into that dairy show." For, let it be understood that there was a fat stock show going on in the exposition building, there was also the third annual dairy show, and at that dairy show the Illinois State Dairymen's Association had been asked to take part, and not only take part, but to use their influence all over the United States for the purpose of getting the assistance of dairymen of the country in making that National Dairy Show really and truly a national dairy institution. I speak knowingly, for application was made by a member of the Illinois State Board of Agriculture to the Illinois State Dairymen's Association at a meeting of their board of directors, and the board of directors ordered your secretary to issue five thousand letters to the dairymen of the United States asking them to join hands with us and go to the dairy show in the city of Chicago on the 8th day of last November. Not only this, gentlemen, but the State Board of Agriculture made a statement to the Illinois State Dairymen's Association that no oleomargarine or butterine would be admitted to the dairy exhibit.

A genuine dairy show they were determined to have in spite of all the oleomargarine and butterine in the country. Those are facts and doubtless no departure from this resolve would have taken place but for this action of the Cattle Grower's Association, this action of the Sangamon County Association, the action of a few stock yards representatives and the president of the Chicago board of trade, (this great speculating institution of our western country so severe on bucket shops; but, oh, so solid on oleomargarine,) who threatened to refuse paying the subscriptions they had put their names down for, unless oleomargarine and butterine were admitted in the building. That is how butterine and oleomargarine finally crowded into the fat

stock show. For a long time the State Board of Agriculture stood firm; the president notified those gentlemen that they could have no room in the national dairy show for the reason that there was no room for them. The board stood firm until the last moment and until it was made apparent to them that the great Stock Grower's Association of the country and its prototype of Sangamon county, Illinois, aided by stock yards operators and the bouncer from the foot of LaSalle street, were there with hands on their throat, saying, "You will have to admit oleomargarine and butterine or you will not have a fat-stock show, except at the cost of bankruptcy and ruin."

We have to have meat; we have to have beef; we have to have butter. The dairymen of Illinois and of the entire country are liberal and intelligent enough to understand those interests stand or fall together.

And further, a widely-spread argument that the action of the board in refusing oleomargarine entrance to the building, would be acting against the best interests of the cattle men and hog raisers, because it diminishes the value of stock, is a very specious argument. There isn't anything in it. Beef products have been low, very low, and they will remain low for some time to come, and the reason is not because the oleomargarine law is in force. The western supply became so great the range got so crowded and unprofitable, the ranchmen in debt, the banks got anxious and nervous about getting their money and commenced crowding them to the wall, saying: "Here, Mr. Ranchman, we must have that money or bust; you have to get it for us if you sell every hoof you have on the ranch." And every hoof on the ranch has been coming to market as fast as steam could get them there and this is the chief reason why cattle have sold low. For three years past it has been the hardest kind of work to raise beef, at remunerative figures, and during two years of that time oleomargarine was on its highest pinnacle. Did that increase the value of stock? Look up your market quotations, they will tell the story.

I want to present to your association a document which may be of interest in this matter. It is a portion of a private letter from

a well posted Massachusetts man to a representative in the Minnesota legislature. Copy was handed to the secretary of the National Butter and Egg Association; the original referred to the Minnesota State Dairymen's Association for action and forwarded to your secretary for the consideration of the Illinois dairymen. In this letter the following statement occurs:

"Did you know there was a scheme on foot whereby the oleo men propose to use the Consolidated Cattle Grower's Association as a cat's paw for pulling the chestnuts out of the fire at Washington? The oleo clique is furnishing the money and the committee of the cattle growers are posing as farmers demanding a new man in place of Hatch as chairman for the house committee on agriculture, so that they can control the new man and put through their schemes for rendering the oleo law worthless and also enable them to pass the Miller bill for finding pleuro-pneumonia, which puts the work in charge of an autocratic commission of three men, with a million dollars appropriation, whereas the bureau of animal industry has practically stamped the disease out of the country already. The whole thing needs to be "fit" tooth and nail for the oleo men are determined to upset the law. We shall fight this racket red hot and will succeed."

Now, those are the statements of a reliable man to a certain extent unprejudiced in the matter, a man merely fighting for principle and for truth, as far as we know. I am sorry that I have been obliged to bring this matter before this convention this afternoon. The Cattle Growers' Association, have an organization second to none in this country, for means and ability; the power of denial is certainly in their hands, if they choose to exercise it. Their denial could have been seen in the light some time ago if they had elected. It is more than two weeks ago since the above statement was publicly made and printed.

FEEDING HOGS.

D. W. LITTLE, Preemption, Ill.

Mr. President, Gentlemen of the Couvention: I have an experiment here that I would like to read, showing the results of feeding creamery butter milk to hogs. At one creamery this year, I fed in all fifty-four hogs. The total weight of these hogs was 6,385 pounds when they were put into the pen. The hogs were not my own property; I made a contract with a farmer in the neighborhood to feed his hogs for four cents a pound, and furnish the feed and the yards. This was on May 15th. On October 31st the creamery was closed. I had at that time 11,455 pounds of pork, a gain of 5,070. I fed 64,357 pounds of milk, 207 bushels of corn; the corn costing forty-two cents, thirty-five and thirty-eight cents a bushel. The milk made me nineteen and a half cents per hundred. Now, these hogs were all kinds, large and small, some little pigs and some old sows. Every once in a while we would take out a few and put a new lot in, so that nearly every week there was a change made in the hogs, and we all know that small pigs and large hogs don't do well together. We had very poor chances during the season, but I think the result is very good, nineteen and a half cents a hundred.

The first of September we put twenty pigs into the yards, these were young pigs that weighed seventy pounds apiece. We fed those pigs until October 31st, two months. The average weight when they were put in was seventy pounds, and when taken out, one hundred and seventy, a gain of two thousand pounds. They ate fifty-nine bushels of corn at forty-two and thirty-five cents a bushel, or \$24.85 worth. They had 17,157 pounds of buttermilk. That buttermilk brought me thirty-two cents a hundred.

What is the best plan of feeding ground feed with buttermilk to hogs at a creamery?

Should hogs have a wallowing place?

Should hogs that are raised on creamery buttermilk have a run on clover or other pasture?

We were informed by an intelligent gentleman at Winchester that the way to raise grasses was to raise grasses. Now it is my firm belief that a hog is a hog, and he will be a hog till time shall be no more. Few creamery men know how to feed milk to hogs. The greatest mistake they make, I think, is feeding too much and not often enough. I think they should be fed five times per day, and the right proportion, as near as I have been able to get at it, is 100 bushels of corn and 2,000 pounds of milk. Give them no more than they can eat up clean at a time. You know how it is when you fill up a large trough with milk and they drink all they can hold, go and lie down near the trough, (for they cannot walk very far.) Soon they will come back, root dirt into the milk, butting it into such condition that it is not fit for food, and the consequences are the hired man comes along, cleans the trough and fills again, losing great quantities of valuable food. After a hog is full he should be allowed to lie down and rest, but as he is a hog he does not like to do so, so long as he knows there is more milk left, and should there be one belated fellow who has been in the far side of the pasture looking for grubs come in, both hungry and thirsty, he knows it, and back to the trough he comes, but can do nothing but watch the other fellows drink, and listen to the music of the milk flowing down the throat of the other fellow. This is a hard moment for hog No. 1. For if Bro. Hoard's nerve theory is good for a Jersey, why not for a Poland China?

DISCUSSION.

Mr. Harrison: "Tell us what you think yourself about hogs having a wallowing place and clover run, and so on?"

Mr. Little: "I cannot answer the question: I came here to learn that. I have fed hogs at three different creameries. At two of these places the hogs had no wallowing places and there was no grass for them to eat. At my home creamery I had

plenty of running water and wallowing holes and plenty of grass. I don't think my hogs did quite as well there, but as I raised my own feed I couldn't tell exactly. I have read from writers that seem to know what they are talking about that hogs should not have clover and sour milk at the same time. I don't know how this is, but I would like to know."

Question—"Did you warm your buttermilk in the winter time or feed it cold?"

Mr. Little: "Always warm the buttermilk. I have a jet pump in the creamery that pumped the milk out to the hog lot. The hog lot is above the creamery and I suppose you know how a jet pump works. You simply turn the steam into the pump and the force of the steam drives the milk up to the tanks, and in the hog lot, and at the same time it warms the milk to about 100 degrees, and sometimes higher, of course, that is according to the elevation, the higher you have to raise it the more steam it takes and, of course, if it heats it too warm you have to let it stand a few moments to cool. I think the blood temperature of a hog is about 85°. Now, you turn cold milk into a hog in the winter time that has been in the habit of eating it warm and he will stand there and squeal an hour and won't touch it. He is expecting warm milk."

Mr. Tenney: "Do you have any trouble about the buttermilk separating when you warm it?"

Mr. Little: "When it stands a few hours in the tank the whey will gather at the top, but when we feed it, we always stir it thoroughly."

Mr. Harrison: "How old do you allow your buttermilk to be before you feed it?"

Mr. Little: "Well, when I am around and the feeding is going on, there is a large quantity of the milk down the hogs' throats before the last of it is out of the churn. There is a continuous stream from the churn into the tanks and from the tanks into the feeding trough and down the hogs' throat. As soon as they have got enough and we are satisfied that they have all

they will eat up clean, we shut it off in the tank, and give them no more for three or four hours."

Question—"Do you give them all the corn they want?"

Mr. Little: "All the corn they will eat after they drink up their milk. You see some days we have a larger amount of milk than others and we make sure that they will take all the milk first because it won't keep, then we give them what corn they want."

Question—"Don't you think if you run that into a tank and mixed wheat middlings with it and let it stand eight or ten hours it would be the best feed you could give a hog?"

Mr. Little: "That is something I don't know much about. It is a bad thing to let sour milk stand; it is sour enough as it is without making it worse. If there is some plan of furnishing ground feed without letting the buttermilk stand to sour more, I would like to know what it is. We feed our corn whole, I don't know how to give ground feed to hogs without their wasting it."

Question—"Would they waste it if you mixed it with the milk?"

Mr. Little: "If it is mixed with the milk they will take and swallow it whole, without chewing, and that, I am satisfied is a bad thing."

The President: "For the last two years I have been feeding at one factory from one hundred to two hundred hogs, something after this gentleman's style, excepting the ear corn. I have substituted middlings, and I think they are very much better, though I have not the figures to show; yet, I know from my bank account when I get through that I had made some money out of it. That is not very good testimony for a member of the association to give, but it is a fact. There is no trouble at all in feeding ground feed, middlings, with the milk. I have used a jet pump such as this gentleman speaks of and I always let my milk stand from five to ten hours, not to sour, but to soak, then they can swallow it whole, and it is in good shape to digest. I tell my man to never let the hogs get hungry;

when he sees one wandering around as though he was hungry, to go and fill up the trough, if it is ten times a day never to let them get hungry."

Mr. Harrison: "Do you consider the evidence that they are hungry the fact that they squeal?"

The President: "Our hogs in this country don't squeal."

Mr. Tenney: "My experience is that a hog will squeal for buttermilk twenty-three hours out of twenty-four."

The President: "Not if you have wheat middlings with it. We would like to hear from Mr. Tenney, who is from near Champaign, central Illinois, where they raise ten hogs to our one."

Mr. Tenney: "When I first started a creamery I adopted the plan of buying hogs through the neighborhood, but I found that I not only bought hogs, but I bought cholera too in every instance, so after the first year or two I gave up feeding hogs, and for a year or more kept none at all. This spring I adopted the plan of raising hogs, and so far this year's experience has been profitable. I have sold five or six hundred young hogs, and I have had no cholera. I have fed buttermilk and ear corn during the last year, but I have about concluded that feeding a hog all the ear corn he will eat is too wasteful."

Mr. F. Cooke, of Iowa: "Last year we sold from the creamery young hogs to the amount of \$482. We fed them about all the corn they wanted along with the buttermilk. Our buttermilk runs from the churn through a pipe and down into a large vat, which is connected with the trough projecting into the pen so that they cannot crawl into it or get mud into it. We sold off in May, and at intervals of about once a month until the 10th of November, when we sold off every hog we had, and we realized \$980 odd. At the present time we have eighty-two shoats that will weigh from fifty to two hundred and twenty-five pounds, according to age. We consider it a success. The corn that we fed them we soaked in the buttermilk, and when we didn't have any ground feed we would put some shelled corn in and when we had neither shelled nor ground

we would throw out a few bushels of ear corn. They have a clover pasture to run in, and a small stream runs through it where they can wallow. Our pigs never did better."

Mr. Tenney: "Won't you tell us whether you have noticed any trouble in feeding clover and buttermilk?"

Mr. Cooke: "None whatever, we have not lost a hog from any disease whatever."

Mr. Harrison: "An old gentleman that has raised hogs all his life was telling me this fall of the various methods he has pursued in feeding them, and he thinks the most successful is to feed about all the different kinds of grain that he can get ground together, rye, oats, corn and barley, and this mixture together with buttermilk, he claims has given him better success than any other way."

Mr. Boyd: "I do raise a few pigs on the farm, but we don't make a business of raising hogs. Most of our milk is fed to calves. We give our pigs mixed ground feed with buttermilk."

Mr. Hostetter: "What kind of ground feed do you use?"

Mr. Boyd: "Corn, oats and bran. It makes very nice pork."

The President: "About this wallowing place for hogs, my experience is that you can't make a very neat, clean animal of a hog. Mr. Little says a hog is a hog, and I am in the habit of letting my hogs have anything they want that conduces to their comfort, and I notice that in a warm day they enjoy getting into a mud hole. We have a creek large enough for every hog to get into, and they make all the mud holes they want. I fed nearly five hundred last summer and didn't lose a hog."

Mr. Little: "I don't know much about this, but sometimes I think it is a bad thing. All these fancy dairymen say it is a bad thing for a cow to go into a pond and stand there through the day, and I suppose cows like it just as well as hogs do. I know that my hogs, right at home, under my own eye, never do as well as those of the other creamery, which has no wallowing place, but there may be other reasons for that. I want to find somebody who knows about this. We are after facts."

Mr. Cooke: "You cannot raise a hog if you bring it into

the parlor. There seems to be a natural element for the hog. My experience is this, that if a hog is injured in any way and you give him a good mud hole to wallow in he is all right. If he gets a cut or a bruise and you let him get into a mud hole and throw him a cob of corn once in a while he will come out all right. I have seen a hog that had jumped through a wire fence and been so badly cut that the entrails were almost out, but there was a mud hole near by and that hog instinctively made for the mud hole and remained in it six weeks. He came out finally all right. Of course we had to feed him."

Mr. Halleck: "I believe when a hog is sick he knows what he wants, whether he wants to lie in the sun or on the grass or in the mud. My best remedy for a hog, no matter what is the matter with him, is to give him a mud hole, and if there is none about I make one. I dig a little hole in the ground and put two or three buckets of water in and let him nose around and he will do the rest of it, and I don't believe he is such a fool as to stay in a mud hole when he is sick unless it is good for him. I never had a sick hog in my life that was not helped by a mud hole if there was an opportunity to turn him out."

Mr. Lamb: "The virtue in the mud hole to the hog is nothing more than anything else that will take the fever out. If the hog has a sore and you put wet clay on it it will take the inflammation out, and I don't think there is anything better. But if they can get the coolness and moisture to take out the fever in any way, that is what they are after. When I came to Illinois I raised a great many hogs; I went down in a slough and took scoops and made a regular wallowing place and the hogs would go down there in the morning in hot weather and lie nearly all day and be covered with mud all over them, and I thought it was bad practice. I did not think the hogs did as well as they ought to. I took them away from there and fixed a place in my tank where I always leave enough water in underneath so the hogs can get into it to drink if they want to, and I am satisfied my hogs have done better. I think a hog will go into a mud hole in hot weather and stay too long at a time.

He gets chilled. Hogs want a nice place to lie and there is nothing better than the ground, but they want shade. Through the summer I feed my hogs right out in the clover field. In the first place I take and mix the shelled corn and oats and a little bran. I have a patent trough that holds about two hundred and fifty bushels. There is a board placed so that just enough will come into the trough for them to eat and not waste it, and they will eat what they want and go in the shade and lie down."

Mr. Bugher: "There is one thing that has been forgotten here which is very important to hogs, and that is salt. I have found salt a very good substitute for wallowing, for the reason that it has a tendency to keep hogs cool. Four different times I have had my hogs attacked with cholera and I have stopped it with salt and slack every time. There is hardly one farmer in a hundred that feeds enough salt to his hogs, or feeds it with enough regularity. I give my hogs salt, and another good thing is siftings of coal. They will go for that. Fresh lime is a good thing too. I had some trouble when I changed pasture once and lime and water stopped it right away. If a person will feed salt and some of this coal dust, it will prove beneficial. It seems to be something that a hog wants. I feed salt once a week."

The President: "Why don't you feed it once a month?"

Mr. Bugher: "Because I think it is too long."

The President: "Why not every other day?"

Mr. Bugher: "Because it is too much work."

The President: "The point is here: Would it be much better to keep the salt right before the hogs, just the way that all straight up and down cattle feeders now keep salt before their cattle all the time?"

Mr. Moffatt: "We have a disease that is going around now that has taken from this county already \$15,000 worth of our property and we are anxious to gain any information we can on this subject of feeding hogs. I have been so unfortunate as to have had hog cholera in my herd four times, and I differ from the gentleman that considers salt a great panacea in that respect,

because I have always kept salt lying by my hogs just the same as my cattle. Now, I claim that a hog in his original state is one of the most cleanly animals we have, and we should keep our hogs in as good and cleanly a condition as we can, and will thereby save them from disease to a great extent. If it gets in among your herd, my experience is, that you have got it until you clear them from your yard. You cannot get rid of it, without the germ, the bacteria is destroyed, and that has been known to lie in the ground from six weeks to one year."

Mr. Bugher: "The gentleman says he has tried salt to prevent hog cholera and he considers it a failure. Now, I have had some experience myself in that line. The cholera broke out among my hogs and I went up to look at them and I said to my boys, "these hogs haven't had salt enough." "Well," my boys said, "there's plenty of it lying around." "Yes," said I, "but it is not where I want it. I have no use for it in the trough, I want it in the hog." And I salted the skim-milk thoroughly and gave it to all of them, including some that could not open their mouth. I got them to the trough where the milk was with plenty of salt and ashes in it, and filled them up and I didn't lose another hog. Hogs should have salt every day."

Mr. Little: "I have been feeding hogs about ten years, and whilst my neighbors all about me have lost hogs by the cholera I never yet have lost one. I believe milk is a sure cure or preventive for hog cholera, and this matter of coal slack I believe is a grand thing, also the salt. My father has been in this country about forty-five years and he never has lost hogs by cholera, and he never allowed himself to be out of coal slack or salt. I had a very nice bunch of shoats a few years ago, something over thirty of them. I got careless about feeding slack and they took to coughing. I never heard hogs cough so in my life, they just simply roared, it seemed as if they all had the croup and I was alarmed about it. I went out and gave them a few shovels full of slack; threw it in their yard. In twenty-four hours there was not a hog in that lot coughing,—not one.

Well they went for a few days and then all commenced coughing again. I gave them more slack and the cough stopped again. I kept it up and after a little they quit coughing entirely."

The President: "I had a different experience. I had thirty-four as fine shoats as ever I had in my life and I fed slack and buttermilk to them and they all died but six."

I want to say that the reasons that hold good for keeping cows out of muddy water will not hold good in keeping hogs out of the mud. One reason is that you don't want the cow to drink the filthy water and spoil the milk, and another thing we want her eating all the time, we can't afford the time for her to stand in the water and switch flies."

THE PIG IN RELATION TO THE DAIRY.

BY SANDERS SPENCER, OF HOLYWELL MANOR, ENGLAND.

(Excerpts from address to British Dairy Farmers' Association.)

It is a matter of surprise that so little progress has of late years been made by farmers generally in pig breeding and dairying, after attention has been so repeatedly called to the vast importance of these industries.

Until recently, by far the greatest competitor in pig-raising and feeding was America, a country in which, for the last three or four years, more pigs have died from hog cholera and other diseases than have been raised in the British Isles during the same period of time. From this unsanitary state, from the increase of population, and from other causes, the production of pork has decreased, and the price in the States increased, whilst much of the pork product which has been shipped to Europe has been simply concentrated maize, a compound which does not commend itself to the tastes of those who have had an opportunity of enjoying pork manufactured from milk, oatmeal, wheatmeal, peameal and potatoes. Bacon and hams made from pigs fed on the latter foods are fit for the gods.

THE BREEDING AND MANAGEMENT OF PIGS.

On this part of my subject I feel more confidence in speaking, as although I have not had to deal with any very large quantity of dairy offal—during the twenty-five years in which I have paid considerable attention to the breeding and rearing of pigs—yet I have found skim-milk of such immense advantage, not only for the young pigs, but for getting up show pigs (and, to win prizes under the present system of judging, they must be *much* got up), that I have no hesitation in saying that dairy produce and attention are the two best allies of the successful pig rearer, feeder, and exhibitor. It is scarcely necessary to weary you with a long and minute account of the way in which I manage my pigs, as this has so often been treated upon in one or other of our stock or agricultural papers. Briefly stated, the objects at which I have aimed have been to procure the best possible pigs of their variety, and rear them in as natural a manner as possible to obtain complete success. I am now speaking of pigs for stock purposes. Of course the treatment of pigs for the show pen will vary somewhat, as with many exhibitors expense is no object; but even for this purpose it will be found advisable to keep the sires, the dams, and the bon-hams in good store condition. Next to good food, with milk for the young pigs, I know of no greater aid in the attainment of a healthy state in pig life than exercise, which also tends to develop muscle and lean meat, instead of fat, thus causing them to approach more nearly to the *beau ideal* pig of the bacon-curer. I would even go so far as to say that if pigs of the small and early maturing varieties had been forced to take a certain amount of exercise when they were young, instead of being forced with fattening food, there would have been less reason for complaining of the small litters which they reared and of the much greater proportion of fat than of lean meat in their carcasses. Skim milk may be beneficially employed as soon as the sow has finished farrowing. Two or three pints of it may be heated, mixed with sharps, and given to the sow new milk warm. In

many cases its use may be continued to the sow until the pigs are weaned, but it will sometimes be found that pure or highly bred piglings will suffer from scouring or diarrhœa if the mothers be fed on any great quantity of milk until the little ones are some four weeks old. Diarrhœa appears to arise from the sow's milk becoming either too rich or too profuse in quantity and thus causing indigestion. The little pigs will begin to feed when they are about a month old; they should then be fed apart from the sow with skim milk and a small quantity of unground oats or wheat. This can be arranged either by allowing the suckers to have the run of an adjoining pen, or by turning the sow out for an hour or so, either into a straw-yard, or, better still, on to a pasture. The quantity of food given to the pigs, besides that which they obtain with the sow, may be gradually increased until they reach seven or eight weeks old, when they will be ready to be weaned. If the pigs are not intended for breeding purposes, they should be attended to when they are about six weeks old.

In order to produce the finest quality of pork for the bacon-curer, in the most economical manner, it will be found necessary to begin the fattening process as soon as the pigs are weaned, or in other words, never allow them to get a check through stinting their food. Skim milk, with miller's offal, a few peas or oats, and later on, as the pigs grow stronger, gradually add barley meal and Smith's cocoa-nut meal (in the proportion of four parts barley meal and to one cocoa-nut meal), with milk or whey, until these become the main food, as the pigs reach the weight of 200 pounds alive, and fit for the bacon curer; this should be when they are seven to nine months old—you then obtain carcasses of juicy, tender, lean meat, with a small proportion of fat. Maize is very much used by some persons, but the pigs fattened wholly on it are not so saleable, nor, at the present price of barley, so profitable to the feeder. Little pigs will thrive well on maize meal, provided it is steamed or boiled, then mixed with skim milk and given new-milk warm. Some persons strongly advocate the steaming or cooking of the corn or meal

given to the flatting pigs; I do not think it necessary nor profitable.

I need scarcely say that it is necessary to cook all potatoes given to pigs.

The most profitable breed of pig to keep is undoubtedly that breed which will produce, from a given quantity of food, the greatest weight of pork which will realize the highest price.

THE VALUE OF DAIRY "OFFAL."

I feel sure that I make it as an acknowledged fact that skim milk, buttermilk and whey are of considerable value in the rearing and fattening of pigs, and also that there is a great diversity of opinion as to their value for that purpose. I have the records of numbers of experiments which have been made in America and Germany for the purpose of arriving at their feeding value, but unfortunately in most cases the pigs have either been fed solely on the skim milk, or, if with other foods, sufficient care has not been taken, so that the milk or whey were credited only with the gain due to their addition to the meal or other food, the plan adopted being to deduct the cost of the meal, attendance, &c., and to credit the dairy offal with the profit. It will be generally admitted that skim milk, buttermilk, and whey are not alone a complete or profitable food for pigs, but that when added to meal or potatoes a much greater increase in growth and in meat is obtained than if the pigs were fed simply on the meal and potatoes, or on the skim milk.

If I were to give these experiments in detail it would only add to the length of a paper already too long. I will therefore merely state that, after having carefully studied these experiments, I have failed to obtain much information as to the value of dairy offal for pig-feeding. The results arrived at are so diverse. Take, for instance, the use of skim milk: one experimenter gives figures which, to his mind, conclusively prove that skim milk is not worth more than $\frac{3}{4}$ d. per gallon, whilst another equally conscientious person will assert that the results

of his own experiments leave not the slightest doubt that one gallon of skim milk will produce pork of the value of $3\frac{1}{2}$ d. Again, as to weight of skim milk required to give an increase of 1 lb. in the live weight of a pig, one experiment made it appear that 12 lbs. of skim milk were sufficient, whilst another, apparently carried out as carefully, showed that 23 lbs. of skim milk were consumed for each pound of increase in live weight.

As far as I can judge from my own experience and that of my friends who have paid some attention to this subject, I should estimate the value of skim milk for pig-rearing and feeding at $1\frac{1}{2}$ d. to 2d. per gallon (according to price of other food), providing that proper care is taken to give to the pigs other food which contains a good proportion of the fat, &c., of which skim milk is deficient.

If it be necessary to add to skim milk cocoanut meal, or maize, barley, rice, palm-nut, or other meals to enrich it, how much more needful is it when feeding pigs on buttermilk or whey. To make this evident I give the following as the average of eighteen analyses of whey made by the late Dr. Voelcker:

Water	...	...	...	...	93.02
Butter (pure fat)	...	...	...	...	.33
Albuminous compounds	...	...	...	...	.97
Milk-sugar and lactic acid	...	...	...	...	4.98
Mineral matter (ash)	...	...	...	...	.70
					<hr/>
					100.00

In the feeding of whey to pigs we find science and practice in agreement, as proved by the extensive experience of Mr. John Platt, a member of the firm of Messrs. Platt and Dobell, who are carrying on a large cheese factory at Wem, in Shropshire. In response to my invitation Mr. Platt very kindly gave me a long and most interesting account of the pig-feeding carried on by his firm. In the year 1884 they fattened 1,300 pigs which were sold for some £6,500. £3,000 worth of meal was used, besides an unknown quantity of whey. If we take £2,600 as the cost price of pigs, this leaves the sum of £900, and the

value of the manure, as profit and to pay for attendance, the whey, and interest on money. It is, of course, impossible to allot the gain to the meal or to the whey; but this we can claim—that if there had been no whey the pigs would not have been fattened. In 1885 and 1886 outbreaks of swine fever occurred in newly-bought lots of pigs; this necessitated the clearing out of half-fattened pigs, so that the pig-fattening in these years resulted in a loss.

Mr. Platt considers that factory whey, if fed alone, is of very little value. In proof of this he gives an experiment made with fifty pigs weighing from 100 lbs. to 120 lbs. These were fed on as much whey as they chose to eat, consuming about $2\frac{1}{2}$ tons weight of whey per day; or, as Mr. Platt added: "Each pig drank its own weight in whey every day, and only increased in value 6d. to 9d. per week."

Mr. T. Carrington Smith, a gentleman who is well known as a most careful observer, has very kindly sent me a copy of his pig-feeding account for 31 years. The yearly average number of pigs fattened was 45, of bags of meal consumed 95, and the profit £55 18s. 7d. Mr. Carrington Smith points out that after making allowance for attendance, value of manure, &c., he considered that the whey resulting from each cow has been worth 30s. a year for pig-fattening.

Both these gentlemen complain most bitterly of the serious loss which swine fever has occasioned them, and to the great hindrance it is to the successful carrying on of cheese-making. If our political friends who pretend to be so desirous of providing allotments, cow plots, and cows for the laborers, were to take steps to stamp out swine fever, their efforts would be much more appreciated and much more beneficial to the artisan, the laborer, and the dairy farmer. In fact, unless the country is cleared of swine fever it will be impossible for our small dairy farmers to carry on their operations profitably, as many of them look to their pigs which consume the dairy offal to pay the rent. I would venture to point out that in estimating the value of skim milk, whey, &c., we must not only take their intrinsic

value as meat makers, but we must also credit them with the increased return obtained from the other foods when fed to pigs with milk, whey, &c. That this is the case does not admit of a doubt.

In conclusion, I cannot do better than quote a paragraph from a letter received from one of the oldest members of the British Dairy Farmers' Association, Mr. T. Nuttall, who wrote: "That the pig is necessary as a most important factor in the successful carrying on of a dairy business needs no assertion from me, for unless the offal from a dairy is properly and profitably utilized one of the sources of profit is missed." That is, I believe, the opinion of all present, who will, I trust, more readily excuse the extreme length of this paper when they consider the great importance of "The Pig in relation to the Dairy."

The convention adjourned to meet at 8 o'clock the same evening.

EVENING SESSION.

Convention met pursuant to adjournment at 8 o'clock P. M., same day.

Music—"Welcome," male quartette; Dr. Cogswell, Messrs. Fischer, Sherk and Heckler.

The secretary read the following letter from Gov. Oglesby:

SPRINGFIELD, Ill., Nov. 21, 1887.

R. LESPINASSE, ESQ., SEC'Y STATE DAIRYMEN'S ASSOCIATION,
CHICAGO, ILL:

Dear Sir—I regret exceedingly that it will not be possible for me, under existing arrangements, to attend the next Illinois State Dairymen's Association, to be held at Mt. Carroll, 14th to 16th of December inclusive.

It would afford me great pleasure to attend one of those associations. The subject is one of great interest to the entire population of our state, and as I expect to go to farming (indeed, am farming now) at the close of my term, a little knowledge upon the subject of making butter and cheese, taking care of

milk, raising the right sort of cows for that purpose, and taking care of them through the summer and winter season, is well calculated to help my limited knowledge upon the subject.

Please express to the officers and directors of this association, my regrets and excuses for not being able to be with them.

Yours respectfully,

R. J. OGLESBY.

The appointment of committees was announced as follows:

Nominations—W. H. Hintze, L. M. Potter, C. F. Tenney.

Oleomargarine—Hon. John Stewart, H. B. Gurler, R. Lespinasse, D. W. Little, John Warne.

Implements—E. E. Garfield, T. H. Baker, A. M. Todson.

Resolutions—Jules Lumbard, D. W. Wilson, John Boyd, N. E. Dillie, J. H. Momard.

Cream—J. Y. Sawyer, Jr., E. E. Chester, J. B. Bertolet.

THE SECRETARY:

Ladies and Gentlemen—The nineteenth century is a marked period of strong individualities and specific specialties. It is an age of action and progress, and also a time of thought. It is an age in which the practical application of study and intelligence to the daily avocations of men and women is recognized as an absolute necessity to success and perfect, happy homes.

In the struggle towards the goals of perfection and the summit of sometimes unrealized ambition, many things have arisen to either cheer us or pull us down on the way. Among the strongest pillars of the temple and the most powerful to incite the men and women of the farm to more earnest and intelligent deeds, have stood and stand to-day the agricultural and dairy newspapers of the United States, under the direction of energetic, practical and enterprising men, who have taken much pride in their work and oftentimes derived more glory than shekels for their incessant efforts, midnight studies and words of wisdom.

The divine promise that the harvest shall not fail, stands good as in primeval times, but the effect of an intelligent and timely sowing, the effect of a sensible application of wondrous

improvements and progressive ways will show a marked difference in the results of individual harvests. The science of the farmer, like that of men of the learned professions, is progressive, and his onward march in the career of improvement, if not so brilliant, is equally decided. The agricultural press of our country has educated the popular mind and opened the avenues of knowledge, which our agriculturists have followed in search of better practices, better means, better intelligence. It has worked a mighty revolution in methods of tillages of dairying, the use of labor-saving apparatus, tools, seeds and plants, the rearing of finer bred animals specially adapted to the end sought, in a word, it has been a safe beacon light.

The agricultural interests of the country owe a debt of untold magnitude to the talent, industry and honesty of the agricultural press, for under a wide diffusion of the humanizing influence of intelligence, the generation of slaving farmer has perceptibly died out.

Among the most noted representative journals in the field of American agriculture, our Illinois agricultural and dairy newspapers are specially to be mentioned. The board of directors of the Illinois State Dairymen's Association addressed special invitations to veterans to these join with us in this feast of reason and you have noticed before this time that our programme embraces the names of four of our Illinois newspaper representatives, who have promised to address us on prominent subjects, full of vitality and interest.

Ladies and gentlemen, I now have the pleasure to introduce Hon. Milton George, of the *Western Rural*, Chicago, a representative farmer as well as representative agricultural newspaper man.

DAIRY INTERESTS AS THEY RELATE TO OTHER BRANCHES OF AGRICULTURE.

MILTON GEORGE, ESQ., Editor *Western Rural*, Chicago:

The barbarous and half civilized races of the Orient may have been content with the lacteal product of the goat or the camel, but with the civilized peoples from the patriarchal days of Abraham to the present time, the dairy business has figured as a prominent feature in agricultural pursuits, as it relates to that branch represented by the cattle interest. In fact, the cow for a long period of time has held the intimate relation to household economy, as a sort of family step-mother, or did while the butter and cheese were made from milk and cream.

A wholesale rivalry has stimulated the industry in the direction of attaining the highest degree of excellence. The advancement has been marvelous during the past twenty years, not only in the magnitude of the business, but in the uniform and improved quality of the product. The time, labor and patience necessary to attain these results have been enormous, and at the propitious moment when American dairy products were gaining the favor and confidence of home and foreign consumers, and a market found at remunerative prices, there arose a satanic rival in the form of butter imitations. Not a productive rivalry, but a competition born of modern science, backed by insatiable greed of capital, by which the refuse fats of any dead or decaying animals may be converted, with other adulterations, into the appearance of pure butter, cheese or lard. The frauds should be entirely prohibited, though we have not taken this radical position publicly before, by strict laws and severe penalties and should include all food adulterations. In spite of all the legislation we have had upon the subject in our efforts to regulate the manufacture and sale of the stuff, consumers are eating it by the ton in Chicago and elsewhere without knowing it. The law stops at the critical point. Hotel keepers, restaurant and boarding house keepers are not compelled by the law to inform

their boarders that the tasteless, therefore innocent looking mixture, called butter, costs them a few cents per pound less than the pure article would cost and that they are defrauding their customers to that extent.

Having gone into partnership with the bogus butter makers, on the regulation plan of license, the rich philanthropists of the great cities have been encouraged to try their skill on the lard so that a very little fat of swine goes a great way toward greasing the pastry products of the world; and the time is near at hand when the question of commercial lards for domestic purposes will be settled. The mysteries of stock yard operations are gradually being revealed to consumers and the prejudice against the beautifully white oleo for pie crust is increasing. In the face of all this, the selfishness of the beef and pork producers encourages them to believe that the adulterations of butter will make their business more profitable, which is a mistaken idea. If any one branch of agriculture suffers, by reason of unfair competition, all alike suffer.

In agricultural resources, ours is a marvelous country. Confine the productive capacity of our vast land area to a single product, and there would be a ruinous glut in the markets of the entire world as far as they could be reached, but let the economic law of a diversity of crops prevail, and an active prosperity will take the place of stagnation in business.

There are mighty forces in this nation, directly at work against the farmers, in the form of organized capital. Is it not imperative that the productive classes stand together for self-protection and mutual interest? Those engaged in any one branch of agriculture should be interested in the success of all the others.

The first duty the producers of this country owe to themselves is to abolish the bogus butter fraud and every other fraud upon honest production, in the form of food adulteration, by strict prohibitory laws. The reason for such legislation is obvious. The competition is an unfair one and should not be permitted. The health of consumers is endangered. The commer-

cial honor of the nation is at stake. We are losing our trade with foreign countries, owing to the uncertain character of our products. Business integrity is at a low ebb at the present time in this country, and the fact that these frauds are perpetrated by men prominent in business and social circles inflicts upon society baneful influences which are far reaching and dangerous to our future well-being as a nation. Not dairymen alone, but all branches of agriculture suffer by these frauds.

If our dairy interest could be protected and so encouraged that its development and growth could continue in the future as it has during the past quarter of a century, it would do more to relieve the other branches of agriculture from the present depression than any other possible agency. No other branch of husbandry does so much to promote and preserve the fertility of the soil as the dairy. The dairy then, to a good degree, forms the basis upon which rests the prosperity of other productive industries. Beef and pork producers would be relieved of a ruinous competition by the extended area devoted to the production of milk, butter and cheese.

The principal source of the prosperity and wealth of our country is dependent upon the surplus which we send abroad of our products. Our farmers may plant, sow and cultivate the the soil and thus put in operation the forces of nature by which the grains and grasses are produced. These constitute the raw materials in agriculture, but the process which converts them into the more concentrated and valuable product of butter and cheese, requires a higher art than the mere cultivation of the soil, to produce them, and when these articles reach foreign markets, their uniformity of quality and high character should represent a standard of excellence for American honesty as well as the character of her agricultural products.

The character of the foods intended for human stomachs, is too lightly passed over by the slipshod methods of our people. If the bogus butters are wholesome and legitimate mixtures, in all their filthiness, why should the farmers be compelled to devote their time, energies and skill necessary to produce a faultless

article in the honest product? Why are consumers so particular about the nicety of real butter and then manifest so little interest in the fact that the butter markets are being filled with the neutral oils from the refuse tanks and garbage boxes of the back alleys of the great cities? Are the noses the only organ of consumers which is to be consulted on questions of discrimination while the stomach is being made the dumping ground of that which is vile and insidious in character? If we applied a little of the practical and common sense methods in the selection and character of our own foods, we would be more likely to carry the same intelligent thought into the care of domestic animals. We believe that too little attention is paid to the constituent elements of the foods provided for the stock upon our farms, for the promotion of their health, and for the reason that they, the animals, constitute a portion of our food supplies. The general farmer, as well as dairymen, have more or less to do with domestic animals, and should pay more attention than now prevails among them to the relations which exist between food elements and animal growth and development, or how the milk of cows may be affected detrimentally by such lack of knowledge.

Too much is done in this world by force of habit. In fact, he is a brave man and full of inventive resources, who is able to break loose from old customs and adopt the new and improved methods. Some of the foreign markets have been closed against our pork, owing to the discredit brought upon it by the diseased conditions of our swine, and the delusion that an insidious plague is abroad in the land, decimating the herds. The destructive character of the disease is not an active one at all, but passive in its nature. There is a law of compensation pervading the universe. In all nature the relations which one part of creation bears to another are hospitable in a sense of conservation. Air, earth and water teem with nature's scavengers in the form of devouring parasites to put out of the way whatever is deficient in the living force necessary for vigorous self-sustainment. Disease is the degenerate condition of an animal which becomes the battle ground between the organism and bacteria which take

possession. In the strife for existence it is a survival of the fittest. Nature, when her laws are obeyed and her conserving forces have untrammelled play, fortifies the system against the undermining attacks of these parasites. In fact they become food for the healthy animal life. It is only when nature's laws are violated by irregularities that animals lose their grip on life and succumb to the scavenger hosts ever waiting to prey upon weak physical organism. Parasites are not the cause of disease, but the results of wrong conditions of food and care. Poorly ventilated stables, bad sanitary surroundings, unwholesome and indigestible foods prepare the way for the ravages of these dreaded bacteria. It is health and happiness to the human family; it is money in the pockets of the breeders of domestic animals, to understand the act in harmony with the natural law.

The muscular and bony structure of an animal constitutes the vital machinery, and unless nourishment is provided suited to its needs, organized existence is assimilated into the lower forms of scavenger life.

The too much corn diet is the curse of American methods of feeding domestic animals. Corn contains little else than starch, which is carbonaceous or fat forming and is an excellent product for that purpose as long as the powers of assimilation can be maintained.

For dairy cows, all growing stock and work horses, the potentiality of the foods lies in the line of the phosphates and nitrogenous elements, a large proportion of which should constitute the regular diet.

There is nothing more sensitive to these wrong conditions than the products of the dairy. Diseased germs are transmitted with the milk from unhealthy cows, which forms a destructive element in the product.

In conclusion will say that all farmers in their respective capacities should stand in hospitable relations to each other; lay aside all selfish motives and organize for their mutual good. The narrowness of partisan prejudices should no longer stand in the way of political action when such action is necessary. While

agriculture is the basis of the wealth of this nation, the producers of wealth is the only class not thoroughly organized. When the farmer goes into the markets to buy the necessities of life, he meets combinations controlling the price of coal, sugar, coffee, petroleum, lumber and even the circulating medium in the form of money, as the instrument by which he pays. Add to these the increased cost of high tariff duties, and compare them with existing prices for farm produce. When he goes into the market to dispose of the results of his labor, he is again confronted by capital combined against him in the form of elevator rings, grain buyers' associations, the stock yard monopoly, board of trade gamblers, railroad discriminations and grievous extortions by railroad management generally. Unless the producers exert themselves in their own behalf in demanding their rights, who will do it for them?

While capital is combining for the purpose of taking undue advantage of the productive classes, is it not proper that the producers combine for self-preservation and mutual protection? Is it not possible for the dairymen to join the organized forces of productive industry and find a market for their dairy products through other channels of trade than those in contact with the bogus materials now so deceptive to consumers and disastrous to the dairy interest?

MILTON GEORGE, Publisher *The Western Rural*, Chicago.

Music—"Sailing"—Solo; by Miss Fern C. Frazer.

WOMEN'S RIGHTS ON THE FARM.

MRS. VENA MACKAY BEEDE, Chadwick, Ill.:

We suppose the men grow sort of tired of this cry of Woman's Rights, but then, if they would stop one moment to think, they must see that women have rights to be looked after just as well as men. We women do not object to men looking after their rights, and what is more we lend a helping hand.

Women have played no small part in gaining our national rights for man.

Man is continually asserting and demanding his rights, and we suppose he will continue doing so to the end of time. Woman has the same right, and of course she wants a helping hand. Mutual help for mutual good.

Men do not monopolize all the rights. We women have a share, and we are not satisfied. At present the demand seems to be for an equal share. When that shall have been gained, no doubt, in accordance with woman's aggressive and progressive nature she will demand greater rights than man.

It looks as though the right of suffrage for woman is about as near as civil service reform question, the trouble about this voting business is, the men think the women are not ready to vote. They say, "whenever the women are ready to vote they can vote." Now we women know better; it's the men who are not ready for the women to vote. Whenever the men are ready for us to vote we can vote, and no sooner. Man's belief, very naturally, is made up of his desires; he does not want woman to vote, so he believes she ought not to. Then a man is forever taking the dark side of this voting question; he doesn't see how it can be managed. Perhaps if we could put ourselves in man's place and think as he thinks, we should dislike very much to think of hurrying home before noon on presidential election day to take care of things at home, while wife and daughters went to vote in the afternoon. But why couldn't the brighter side present itself as easily. Why couldn't he be thinking of the pleasure of taking wife and daughters with him to the polls; so many more votes from his family—one, two, three, four more votes for ———.

However, we must let Mrs. Livermore, S. B. Anthony and all the others who know how, talk the men into the voting business; only we wish they would hurry them up a little to give us a chance to vote on the temperance question.

The men know very well that woman is ready for that question and that she would vote soberly and intelligently if the

opportunity were hers; that is more than could be said of a large share of men who vote on the temperance question.

Our farmers have been, and are, too shiftless for anything about the saloon existing in the towns about us.

If we farmers' wives and daughters had the right to vote we wouldn't stand by so quietly and foot the largest share of the bills that intemperance makes, besides suffering the effects of the saloon in our homes—and not have one word to say as to whether the saloon shall exist or not in these towns about us; but that's the way our farmers do, and we think they ought to be looking after their rights in that direction.

But then it seems a little out of place talking about intemperance at such a time as this. The very name, Dairymen's Association, is so suggestive of good rich milk and fresh butter, that we can't help wishing that these people who drink beer and whisky for the health would take instead a glass of good, rich Jersey milk as they would a glass of beer; more likely they would get well and stay well.

And if these men in the towns who spend their scarce nickels for beer, whisky, tobacco and billiards, would first supply their families with what was needed of good milk and butter, it would revolutionize the world. Only think of the prospects of the dairy business!

If the laboring classes in our large cities did not spend so much of their earnings in the saloon oleomargarine would never have been invented. If a large share of the earnings go for whisky, what is left has to be made the most of in their families and of course good milk and fresh butter are luxuries not to be thought of. Oleomargarine and butterine have to be invented to take the place of butter. Bad whisky is manufactured for the same reason. Pure whisky costs too much; so viler, more poisonous stuff takes its place.

If our farmers who are in the habit of spending their nickels in the saloon and billiard hall, would, instead, use the money in fixing conveniences to help wives and daughters make gilt-

edged butter, what a step that would make in the progress of civilization!

Our farmers' wives and daughters, as a class, are most earnestly opposed to the liquor business. They help earn this money that goes for intoxicating drinks—if the husband and father is a drunkard they earn most of it. But the wasted money is only a small part. Now who says they have no right to want to vote the saloon out of existence?

Perhaps there is no other vocation where the need of equal rights is more plainly to be seen than on our American farms. As a rule our women on the farm work just as hard as the men do. This is one of woman's undisputed rights; it usually does not discommode nor interfere with man's comforts in any way to have a woman work as hard as he does. Woman does not find fault about it either, as long as she receives equal pay for equal work. All favors gratefully received.

A woman has just as much right to work for a living as a man. It is as disgusting to see an idle, aimless woman as an idle, aimless man. A shiftless farmer's wife is as bad as a shiftless farmer husband. But isn't it unfortunate to see a shiftless, good-for-nothing man married to a good, thrifty woman, and vice versa—two houses spoiled where one would be enough.

Farmers' wives and daughters are necessarily hard workers. A large share of our farmers are debtors, and many homes are to be paid for by practicing the strictest economy. Good help is scarce; children have to be fed, clothed and sent to school. The tendency is for our women to over-work:

“Does the road wind up hill all the way?”

Yes, to the very end.

Will the day's journey take the whole day long?

From morn' till night, my friend.”

This is the average woman's work poetically expressed. It means that that she works hard physically and mentally—yes, mentally we say—for a woman who takes care of a house, washes, irons, cooks the food, looks after the dairy, sews for a

family of six, eight, or possibly a dozen, and all this often with less fatigue than the woman who does nothing feels, who says she does not work mentally?

And yet we feel there is considerable room for improvement in the mental part of the work. The temptation is great to allow household and other cares to crowd out much of reading and study that is certainly an influence that tends to lift us above our own little narrow worlds. Women have no more right to neglect the cultivation of the mind than men have.

As a rule, farmers agree that a farmer's wife earns her bread and butter. But judging from the actions of many of them they believe she earns nothing more. Their actions say: "Well, our wives and daughters do lots of work; they make our homes pleasant places to stay in, and it would be a hard, dull world without them. But pshaw! their work is easy, and does not count money. A woman doesn't know how to handle money anyhow." Such a thinker ought to do the housework a week, for even a small family, to have his ideas reformed somewhat. Or, if he should prefer it, hire the work done for a year that is done by his wife and see if a shortage in income did not appear from more than one direction. We have observed that the more a man knows by actual experience of housework, the more respect he has for that part of "woman's sphere." The sense of justice is just as keen in woman as it is in man.

We never could understand why there should be any differing between a farmer and wife about money matters, when both work just as hard as they can, both are saving persons, and are working for a common purpose. Now, why should one more than the other have the entire say about every dollar that leaves the purse? It is simply exasperating to hear a woman begging of her husband for money that is her own by actual earning; and it is as exasperating for a man to beg of his wife for money. It is not so common, but we have known women to hold the purse strings as selfishly as ever did any man.

A woman has a right to know at all times how she is situated financially, and then, naturally, she asks herself the questions, as

do the men: Shall I spend this money? Can I afford it? and so on. However, if either has to hold the purse, that one is the wife, for several reasons; generally she is the more saving; she is almost entirely free from the use of intoxicating drinks and tobacco; she is not expected to treat her neighbors when she meets them on the street in town. If a man had to ask his wife for every nickel he spends in drink and tobacco for treats the treating business would cease before many years.

Another place on the farm where equal rights are needed is in the remuneration for work among boys and girls. Usually the farmer pays his son at least the wages of a hired man when he is able to do a man's work. This is right. John is learning something of what it costs to live, and the earlier he learns this the better.

Daughter Jane is needed in the house as much as John is out in the field. She works long and faithfully, often adding outdoor work to her many indoor duties. But, how often do we find Jane receiving anything more than board and clothing for her works. If she wants money she must hire out, teach, clerk in a store, sew, or do any other work that brings a salary. Jane's life on a farm is a very independent life as far as work is concerned.

The boundary lines of woman's sphere are very indefinite indeed. Our farmer girls are expected to be good housekeepers and good house women. They can be good musicians and good dairy maids. They can be good artists and take care of the poultry, cows, the calves, and the pigs. They have the right to do *any* farm work that duty or choice demands, and strength permits, and they have as much right to demand pay for their work as our farmer boys have.

We need refined, educated women on the farm as they are needed everywhere. There is no more need of Jane leaving the farm to engage in teaching or any other profession in order to make use of a good education than there is for John to leave for the same reason, provided it is where she is needed, and it is her choice occupation.

Men and women in any and every honest vocation who possess intelligent educated minds, whose manners arise from kindly, honest hearts, and who perform their work cheerfully, faithfully and skillfully, they are the class that, as yet, America acknowledges as her nobility. There is much room for improvement in the comforts for women in our country homes.

Women have no right to be without conveniences in the house that save time, strength and money, any more than men have for their work out of doors. We blame the women mostly for the lack of indoor conveniences. Most women are not born mechanics. They do not like to trouble themselves with machinery. We learn to do things a certain way, and we keep at it to the end in just that same way. There is so much to be done and just so much time in which to do it, that we can't take time to learn any shorter and easier way. Two-thirds of our women would rather bend over the tub, rubbing the very much soiled clothing, which farm work necessarily makes, in a most heartbreaking and backbreaking way, than bother with a washing machine; and we have washing machines that are great helps, even if they do not do away with *all* the work, as the agents sometimes claim they will. This, if she can afford it, a woman has no right to do; she owes it to herself and her country to make all work as light as possible for herself and those about her. We do not work for the sake of working, but for a purpose, and the easier we can gain this the better.

He is a wretched sort of a man that will begrudge his wife a washingmachine or any other labor-saving machine or convenience as long as he supplies himself with farm machinery and has a dollar in the bank. That man ought to be obliged to keep the weeds down in a 40 acre corn field with an old rusty hoe.

And then a woman on the farm, or any where else, who does not supply her kitchen with conveniences simply because she hires a girl to do her work, that woman is a most wretchedly

mean woman. Such a woman ought to be obliged to do her own work, and take in washing besides.

There is hardly an excuse in these days of dairy conveniences for a woman making 30 pounds of butter per week with a dash-churn and working the butter with her hands.

Our farmers' wives have a right to good, comfortable, sunny homes if they can afford them. There is great inconsistency in an uncomfortable, pinched home for a hard working wife and family, and a large bank account that swells with its yearly deposits.

They have a right to beautiful homes and beautiful surroundings. There is nothing that wealth can bring that is too fine or too enjoyable for the woman who has worked for a living if her tastes are so inclined and her purse permits. We wish for every working woman a just reward for her toils. After all it is the little every day rights and wrongs that have the most to do with our happiness. But is it not a blessing for woman as well as man that our happiness does not depend upon the possession of much land and a pile of gold? Of course, it takes money to supply women the necessaries of life, and what woman would not like to possess at least the pile of gold?—but it could only add to our happiness.

Many of our farmers are wealthy, but the large majority of us have to be content with what is termed well-to-do homes and surroundings. Our enjoyment of life is not in proportion to our wealth, but in the ability to enjoy what is about us.

“However high be placed ambition’s goal,
Man’s daily life must most refresh the soul.
The precious things that make existence sweet,
Spontaneous spring like grass beneath our feet!
The small events of each succeeding day,
’Tis these that make the greensward of our way.
The plants of fortune bloom but here and there,
Life’s humbler green outreacheth everywhere.
And happy he to whom contentment brings,
The sense of beauty seen in common things.”

Woman's work on the farm has its share of drudgery, but what work for woman or man is without its share of drudgery in some form? There is no need of it being all drudgery. If the road does wind up hill all the way there are and ought to be pleasant resting places—farming has many advantages for woman as well as man. There is no life on earth so independent, so filled with pure, mutual interests and pure pleasure as life on the farm, if made for both women and men what it ought to be and what it might be.

Music—Male quartette.

MR. JONATHAN PERIAM, Editor *Farm, Field and Stockman*, Chicago:

Ladies and Gentlemen—I am altogether unprepared to talk to you, and had no idea of being called upon, and really do not know what to talk about, after listening to the elaborate essay you have heard to-night. I confess to have been interested in the lecture by the lady to whom you have just listened. Your president, to put me at ease, perhaps, kindly informed you that I was always ready; but I am altogether unready to follow extemporaneously in the happy vein of those who have preceded me. I am a woman's rights man myself, and was particularly interested in that speech, but woman has her sphere and man his. I did feel that I would like to correct the preceding address in one respect, and that is, that I believe that one man is the equal of another and woman of another in their own sphere. Any man is equal to any woman, each in their respective sphere, and all good human people are honorably good. Not that I believe what Thomas Jefferson said, that all men are born free and equal; they are not, but all men and all women are born with the privilege alike of doing just whatever they may be able to accomplish in their peculiar spheres in life. Now, I am quite certain that for over thirty years my good wife has managed me, not only every day, but every hour, and I glory in it. I believe in woman's sphere. Every woman, whether she does

or does not, may manage her husband while she can keep him at home, if they are moderately congenial to each other. Unfortunately, she cannot always keep him at home and then is the very time he is likely to go astray.

Mr. President: "I have been cudgelling my brain all this time to think of something to talk about. I have found it, I think. This glass of water may furnish the inspiration. Nothing could be better. Here is one of the most beautiful, one of the most common, and one of the most wonderful things in nature, liquid, pure, bright, sparkling water. It comes down from the clouds as rain, hail and snow, and runs to the ocean; it pervades the air throughout the universe, although, then it is vapor. Put it out doors, one of these cold nights, and quickly it becomes a solid. When it is pure it is the most healthful thing in the world; without which no grass or other green thing could grow, nor animal life exist. Nevertheless, look well to your wells, I mean no pun, look carefully to your wells, that the source of your pure water does not become contaminated. We do not appreciate this blessing that the great God has given us. We look at the clouds in the morning under the rays of the sun, being dissipated, and what are we looking upon? We are looking upon water mixed as a vapor in the atmosphere, but let a thunder storm come up and soon follows the welcome rain. The Lord has given water this power, that whenever the air is reduced in temperature, by about twenty-seven degrees, the air must give up one-half of the vapor it holds, but suppose you reduce the temperature by another twenty-seven degrees, it then immediately gives up one-half more of the vapor that is left, and so it may go on until finally upon the desert plain we have almost no moisture in the air, and consequently life cannot exist.

The air is composed of two gases and another mixed chemically with them. That other substance is most costly in agriculture, it is what builds up and nourishes our bodies—nitrogen. It also holds the vapor of water and certain acid gas.

There are many curious things in water:

What was it that laid the pabulum for the great and fertile states on both sides of the Mississippi? What made our great prairies what they are? The breaking down of the rocks from the cliff is by water entering seams and freezing it rends great masses, which go thundering into the valleys below. The great glaziers from the north came grinding and pressing southward, covering the whole country, and melting, rushing floods of water carried the *debris* far to the south, and again the gentle rains came down carrying the fine silt and deposited from the hillsides the rich soil of these great prairie regions. There is no other country upon the face of this globe that has so much good, rich arable land, containing all the essentials for diversified agriculture as has our great prairie region of the north. Still this silent medium, water is working to-day as yesterday, and long past, and will work to-morrow and forever, to change the whole face of nature, working constantly in everything on the great principle of compensation. The God of nature uses these little drops of water to continually wear away certain portions of the earth and carry them to other regions to make perhaps fertile land in some future era of this earth's history. The soft water as we get it from the clouds is nature's universal solvent; it takes from everything it passes through, soluble material to become incorporated as part of itself and yet it is as bright and sparkling as though it contained nothing. Again the rain falls upon the mountains, the snow melts and creeps into the crevices of the earth and underlies the whole country, forming streams and lakes and little rivulets, and permeating the soil. It passes over a bed of iron ore, it takes up from that iron ore and coming into a marsh, it spreads over that marsh and fills the ground full of iron ore. It all comes from the water, and yet you cannot see it unless in excessive degree, it may tinge red the earth upon which it evaporates.

The work of God is not for a day; it is not for a year; it is not for an age. For myriad years this earth has been gathering strength and power, in fact we see that in every successive geologic stage of the world it has been getting better and better,

as successive creations, and man has been getting better and better, and woman has been getting better and better, higher and higher, in their physical, mental and in their god-like nature.

To return to water; what is nature doing? She is constantly pumping up from the surface of the oceans, seas, lakes and streams, and carrying it all over the earth this very rain that falls, and this very snow that is falling to-night, to go down the hill sides and over the prairies, and moisten the soil and give it fertility, and through it and by it we live.

Water has a very powerful influence with relation to a production of the dairy; that is milk. When we get milk in the cities, we don't know how much chalk; we don't know how much oleo emulsion, has been put into the milk to give it body and consistency; but we know when we get milk directly from the cow that it is the only perfect food, ready prepared, that has been given to man by nature.

It is the only food that contains all the constituents of life, exactly in the proper proportion, to build up what the scientific men call adipose and muscle, and brain, and every part of the animal body. We cannot assimilate from the food we eat anything that is not entirely soluble in water and in the juices of the body. A horse will drink perhaps ten to twenty pounds of water a day, the good old mother cow requires from seventy to eighty and one hundred pounds a day, and she must have it, or she cannot give down these great messes of rich milk that we sometimes hear of.

Water is the most beneficent as well as the most wonderful thing in nature. Without it the grass could not grow, the trees—the great oaks of the forest—could not spread their branches until three or four or five cords of wood can be prepared from a single tree. It is the carbon contained that makes the wood valuable.

Now what is carbon? Charcoal is nearly pure carbon, the diamond is pure carbon. Carbon can only be burned under peculiar circumstances, and then portions of it passes off in a gas which constitutes nourishment to plants. Thus the law of

compensation works in nature. Whatever nature destroys as not being wanted by one class of plants is exactly suited to another class, so that nothing is thrown away.

We inspire the air in breathing. We expire moisture, mostly water and carbonic acid gas. Now, what does the tree require? By its leaves it inhales air. It must have the carbon. What does it expire? Oxygen! and see here how beautifully nature compensates one with another. We want the oxygen, we must have it, the plant wants the carbon and it gets the carbon that we are constantly expiring; takes it up and utilizes it in the plant and plants give to it again the oxygen that we absolutely need. Could you have any more beautiful illustration of the economy of nature?

One of the most wonderful things in the world under the microscope is a minute drop of water teeming with its minute life, and still more beautiful is a crystal of water when it freezes and takes a solid shape. Water is a solid, water is a liquid, water is vapor, and water is gas, and more beautiful than in any other state when it becomes a solid. There are scientific people who say that the time will come upon this earth when there shall be no water upon the surface. I do not think that it will come either in your time or mine, nor for a good many generations that shall come after us. If such time ever does come the God of nature will have prepared the earth's inhabitants to exist under the changed conditions, and since so far each succeeding generation has been superior to the preceding, it is a fair presumption that in the eons yet to come that man will be brought nearer and nearer to the Creator.

The following committee on butter was appointed by the president:

D. C. Woolverton, Belvidere; W. H. Hintze, Elgin; Robert Harley, Lanark.

Music—Double duet—Misses Melendy, Wildie, Blake and Becker.

The convention adjourned to meet again at nine o'clock A. M. the next morning.

SECOND DAY.

Thursday, December 15, 1887, the convention met at 9 o'clock, pursuant to adjournment.

SILOS AND ENSILAGE.

JONATHAN PERIAM, Chicago:

The word ensilage as well as that of silo, we get from the French, and for the reason that this people first brought the art of preserving green vegetation, fresh (ensilage), in pits, trenches or channels, from which the air was practically excluded; the word silo meaning the place of preservation, the preserved material being the ensilage. A silo, therefore, is simply the place where the vegetation is preserved—a vat, cistern or underground trench where any substance liable to fermentation in the presence of air may be kept fresh by the more or less perfect exclusion of the air. And in proportion to the more or less perfect exclusion of the air, in just that proportion will the material remain in its natural state.

The art of preserving perishable materials, more or less intact, has long been known—even before history began, probably. If dried and kept in that state any article, even succulent vegetables, will keep indefinitely. This is the oldest known method, and was known to the most ancient peoples before they emerged from barbarism into civilization. Even the savage Indians of America thus preserved their corn and other winter vegetables, stored in earth pits covered from the wet. And here I may perhaps be allowed to remark, that no superior method has yet been found, so far as insuring prompt, vigorous germination is concerned. Canning the various products of the orchard and garden in tight, soldered cans, or self-sealing jars, is the most perfect means known. This latter, in brief, is simply a most perfect form of the silo. The preservation of vegetables in earth pits, rude silos, has long been known, and

to-day is one of the best means possible of preservation. All that is necessary is to keep the whole at a temperature that the mow susceptible to cold will not freeze, and the mow hardly will, nor sprout from undue heat. Thus onions most difficult to manage, may be laid, dry, in pits, just before freezing weather comes, and allowed to freeze solid, and not disturbed until naturally thawed in the spring—they come out intact.

Acting upon this knowledge in 1869, while superintendent of the Bert sugar works, at Chatsworth, Ill., I caused a square pit eight feet on each side to be dug, and of the same depth, in stiff clay on a dry knoll. In topping the beets in the field for sugar making, not only the leaves are taken off but also the crowns, from which the leaf had even been attached. The reason was that these crowns contained little or no sugar, but largely of nitrate of potash (saltpetre). I estimated one year that we had from 600 acres of beets over 1,500 tons of these leaves and crowns. Had I known as much of ensilage as we now know this vegetation properly preserved would have half fed the 450 steers we yearly fattened in our stables.

But to return, the beet leaves and crowns were hauled to this pit, thrown in and continually tramped, and pounded solid by mauls. The second day the pit was completely filled and rounded up to present this appearance as shown in the diagram before you. (See page 1.) It was covered with about 30 inches of earth well tramped and pounded over the pit, and as it settled more clay was added, until when fully settled, the ensilage was compacted six or eight inches below the surface of the ground, and the earth covering was nearly or quite three feet thick. The pit was opened in February, and the whole mass except a slight crust at the sides, and about six inches at the top which was blackened, came out in most excellent condition, or in what the German laborers there called *wein sour*. Nevertheless earth silos are not to be commended except as a make-shift for something better. Yet Dr. Pratt, of Elgin, I believe, continues to save corn-fodder laid in trenches late in autumn and with most excellent results.

The art of preserving succulent food in air tight cisterns,—notably brewers' grains has been known for many years in Europe. In Austria-Hungary it is said that beet tops have been preserved since the introduction of the beet sugar industry there in earth trenches, and ensilage of ordinary crops for more than 80 years. These trenches are narrower at the bottom than top in order to get an oblique as well as vertical pressure. These pits are six feet or more at the bottom, and eight feet at the top, and about eight feet deep.

In France, M. Crevat, some years later, says: "Many farmers prefer to dry the material somewhat before pitting. Two or three days drying of corn-fodder will reduce the weight about one-third. The trench is filled and the fodder piled up above the ground to a height equal to the depth of the trench under the surface. The earth is then piled upon the mass before fermentation commences. Two feet of soil will press the mass down about three feet, and in a few days fermentation will cause the mass to shrink to about one-half its original bulk, and the weight of the material by condensation from about 800 pounds per cubic yard will weigh 2,000 pounds per cubic yard. All earth silos, however, must be in soil never liable to water-soak, and in stiff clay preferably, since, if in sand, the air cannot be excluded. Air attracting moist matter soon sets up destructive fermentation. Dislocations of the coverings will ensue and the fermentation will go on to one of putrifaction. In fact strong alcoholic fumes have known to have been thus given off.

The nature of ensilage is so well attested and understood in Europe and America that no plea is longer necessary in its defense. The only question now to be considered is as to the best and cheapest means of preparing the fodder. It is not necessary to go over the means heretofore used to prevent fermentation. The intelligence of inventors has been directed constantly to the easiest and most perfect means of keeping fermentation within bounds, or of preventing its action unduly. The measure of success with silos is in the more or less perfect

exclusion of the air. If this is perfectly accomplished at the time of filling the silo, there will be neither heat, fermentation, decomposition or foul odor.

Mr. S. M. Calcord, of Dover, Mass., a chemist interested in the preservation of substances fresh after long experiment invented a system of ensilaging claimed to be without heat or fermentation to any destructive degree. It is a patented system and controlled by means of pipes within the silo, and other special means. By means of this silo governor it is claimed by such men as Edmund M. Wood, Boston, Mass.; T. E. Ruggles, Milton, Mass.; Charles L. Copeland, Milton, Mass.; C. A. Davis, Natick, Mass.; Bernard Monaghan, Dedham, Mass., that the matter is under control. These gentlemen claim to make ensilage in air-tight silos, cutting the corn in one-half to three-quarter inch lengths, weighing 100 pounds to the square foot, and with this pressure getting one foot or more of juice in the bottom of the silo. The air is removed from the silo by using the silo governor, which causes a heavy vertical, with very little lateral, pressure. Thus, gentlemen, we obtain as uniform results, cold, moist, soft and pulpy ensilage, of the natural color of the corn, without offensive odor, imparting no odor to the silo, barn, hands or clothing, but often of a bright, sweet smell, and sometimes the odor of nice, dry corn-fodder. We feed an average of sixty pounds daily to each cow, and our cattle eat it all without any waste.

When we speak of fermentation and heat the idea is not intended to be conveyed that a silo can be filled with green vegetable matter without eliminating heat. Any succulent vegetable matter piled together in the presence of air commences to heat. If allowed to go on, destructive fermentation sets in, and at length the whole mass becomes putrid and rotten.

Sweet ensilage, as commonly understood, does not represent preserved green forage; the term sweet, as originally used, was not used in a sense as opposite to sour, but as opposed to putrid (as sweet meat.) The effect of fermentation is first alcoholic, next acid, and finally putridity. All the old European systems

of preserving ensilage brought out the product that the Germans call *weine saur*. That is fermentation stopped at a slight, pleasant degree of acidity. In relation to this matter Mr. Calcord claims that the average quantity of ensilage, as heretofore made, is about forty pounds; the cattle do not care for more, but forage made by this system and device can be fed sixty pounds or more daily, and all of it eaten without any waste, giving the best results.

The most interesting feature in this system is claimed to be economy. From corn can be raised the heaviest and best crop of forage at the lowest cost. The big butts contain the most sugar and starch. These large stocks are preserved and come out in a soft and pulpy state, and are all eaten. By those who have tested it by keeping accurate accounts, the average cost of preserved green forage in Massachusetts is \$2 per ton; in feeding value three tons of it is equal to one ton of the best hay, making preserved green forage at \$6, equal to one ton of hay.

I have no knowledge of this process except as I read of it last year. If it has since proved successful it is valuable. Hence, I give you the names of the gentlemen who tried it as I found them.

It has always been claimed that to M. Goffart, a member of the Central Agricultural Society of France, belongs the honor of inventing the modern silo. He, however, simply improved upon and elaborated the systematic conservation of ensilage. His real success was in 1873—the exclusion of air by strong pressure. His testimony is that silos built upon the ground are best for winter feeding, and that underground silos are best for spring and summer feeding. In France, however, soiling—feeding green food in barns—in summer is largely practiced. In this country soiling is not much practiced on account of the labor involved. Hence, it is not necessary to enter into this phase of the subject here.

The practice of preparing fodder and other feed for cattle by cutting is as old as their domestication perhaps. Large vegetables would require reduction in size before they could be

eaten, and the convenience of some preparation and regulation must have been soon recognized. The Hebrews chopped or cut both straw and grain in the bundle for feed, and so did the old Egyptians, Greeks and Romans. Their implements, of course, were rude, but nevertheless the labors of slaves, who required little clothing, and who received only the coarsest fare, was cheap. Silos could not be practicable with us until improved implements and scientific adaptation of means to the end could be brought into play. This is precisely what M. August Goffart of France did, and hence, he may truly be called the father of improved silos.

Hence, the following extract from a speech at Blois will not be uninteresting:

EARLY FRENCH EXPERIMENTS.

In this address M. Goffart held that: "It is important to avoid all kinds of fermentation during and after ensilage. Fermentation can be produced whenever desired, and a few hours suffice to give all its useful effects. Take each evening, from your silo, the maize required for the next day's feeding, and in fifteen or sixteen hours after, however cold and free from fermentation when taken out, it will be quite warm, in full fermentation, and the animals will eat it greedily. Eight hours later it will have to pass the proper limit and it will spoil rapidly."

WHAT WILL ENSILAGE DO FOR US?

Ensilage will give us succulent food in winter, and also enable any farmer to tide over the droughts of summer by saving the material in well built silos, and this at a minimum cost. By this means many waste products of the farm, such as clean, bright straw may be added to the green forage to assist in taking up the superabundant moisture, thus reducing the whole to one homogeneous mass.

Corn-fodder is not a perfect food in itself; it may be made so by the addition of other matter, mill-stuff, bran, etc. To the

dairyman ensilage is of great value, since it will keep the cows up to a full flow of milk continuously. To the shepherd it will allow the use of succulent food, so needful to sheep in winter. It will assist the breeder of young stock in keeping them in full growth and vigor in winter. It will be equally valuable to the breeder and feeder of fine stock, who notably spend large sums in artificial feeding stuffs.

WHAT A FRENCH EXPERIMENTTER HAS SHOWN.

M. Pasquay has deduced some valuable facts in relation to the feeding value of ensilage. It was found that maize fodder (green) has a feeding value equal to 22 per cent. of that of hay; rye fodder, 38 per cent.; grass (green), 34 per cent.; bright wheat straw, 48 per cent. In a good forage ration for a milch cow the ratio of nitrogenous to non-nitrogenous matter should be as 1 to 5, or even as 1 to 4.5; for young animals, weighing between 250 and 300 pounds, as 1 to 3.3; for animals of 450 pounds, as 1 to 4; for oxen in absolute repose, as 1 to 8. Maize forage cut green does not meet this requirement, as it shows a proportion of 1 to 9.24. The maize preserved with a mixture of straw, as at Carcay, approximates the standard, showing proportions of 1 to 4.81. Its increased per cent. of fatty matter represents also a great advantage, being six times greater than in the green maize.

M. Goffart found that his preserved fodder was sufficient without any other food to keep his animals in fine condition. M. Houette, of the department of Yonne, found by experience that the maize should be cut for preservation in silos as near as possible to its maturity, when it is more nutritive, the ears more developed, the stalks more firm, and the watery element less predominant. Being finely chopped before pitting, its fermentation in the silo will soften it and render it as palatable to animals as the freshly-cut maize. He has been able to keep stock upon it to the last of May, and once as late as July, the fodder being in a condition but imperceptibly changed from that of its primary fermentation in the silo. Some question has been raised as to the

propriety of feeding fodder spoiled in the pits, but while no indications showing injury from feeding it were then developed, it is justly considered that it is more available as a plant food than animal food; hence, it is thrown upon the manure pile.

It is not necessary to enter into figures to prove the exact value of ensilage, but the following conclusions from the experiments of M. Grandeau, of France, will be interesting:

The fodder preserved with straw at Cercay shows a remarkable reduction in its percentage of water in straw. It also shows saccharine elements three times greater than that of green maize, while that preserved at Berlin free from straw retains but a fourth of its original quantity. The Cercay fodder also tripled the amount of azotized matter in the green maize, finding a large supply in the associated straw, while in the Berlin specimen it was but slightly increased. Again, the Berlin fodder decreased its proportion non-azotized matter, while that of Cercay borrowed largely from the straw. Both kinds of preserved fodder enlarged their proportions of fatty matter; that of Berlin less than 50 per cent., and that of Cercay six-fold. Of crude cellulose, the Berlin shows a slight decrease, while the Cercay about doubled its percentage. The proportion of ash increased two-fold in the Berlin, and nearly seven-fold in the Cercay. Both kinds showed a perceptible development of acid-acetic and lactic. In the Cercay fodder, the maize was mixed with half of its quantity of straw. As the result of his investigations, M. Grandeau came to the conclusion that the combination of straw with maize added very considerably to the nutritive value of the fermented fodder.

In a subsequent statement M. Grandeau explains that the specimen called green maize in his analysis was partly desiccated by contact with air and sun heat. This would more particularly affect its percentage of water. From a specimen freshly cut he obtained, by analysis, the following percentages: Water, 86.20; sugar, 0.43; azotized matter, 0.90; non-azotized matter, 7.67; fatty matter, 0.18; crude cellulose, 3.67; ashes, 0.95.

M. Grandeau's conclusion in favor of the mingling of straw

with the maize called forth considerable criticism, but after a careful reconsideration of the question he adhered to his opinion. The transformation of the buried fodder embraces two important elements of advantage: 1. The transformation of a part of the starch and cellulose into sugar; and 2, the enlargement of the azotized matter by the destruction of a portion of the fecula of the cellulose.

SIZE OF SILOS WITH REFERENCE TO NUMBER OF ANIMALS.

While ensilage may be kept more or less perfect in simple pits, eventually the cost is reduced by the best constructed silos. The silos need not be expensive, but they must be built thoroughly, because thorough building is cheap building in the end.

A cow will consume full ration from fifty to sixty pounds of ensilage a day. A cubic foot of ensilage weighs forty to fifty pounds, according to the material and pressure employed. One and a third cubic feet daily will keep a cow; one cubic foot will feed a sheep a week, and fully one and a half cubic feet will be required daily for an ox. To feed a cow six months will require about two hundred and fifty cubic feet of ensilage. If you have two cows a silo 10x10 feet, and 10 feet deep will hold about twenty-five tons, and be ample for six month's feeding. A silo 10x10x30 feet would keep six cows on nearly full rations, or double that number when other food is used to supplement the ensilage. Hence, the dairyman feeding half rations, that is, half ensilage and half other food, could feed thirty cows for six months from a double silo, each compartment being 12x12 feet and thirty feet long. An extra silo would tide double this number of cows over the usual six weeks of summer drougths. At the time, some years ago, when the question of ensilage began to attract general attention, impressed with my own experiments in saving green fodder in earth pits, I brought together from a variety of sources the following incorporation in the

Home and Farm Mutual, in relation to building silos, for the reason that the labor may be performed by any stone-mason or bricklayer, and carpenter. Inspect them:

TO BUILD A SILO.

Build it so it may be entered directly from the feeding stables, and one-half below the ground. Eight feet below and four feet above, the upper portion banked up with the excavated earth, would be better. There must be a double door at least five feet high and three feet wide for ease in emptying the silos, after the first section is removed to a level with the bottom of the door. The ensilage nearest to the door should be supported by planks fitting into and inset in the wall, next to the door, to be removed one by one as the ensilage is taken out.

The drainage under the foundation should be made perfect by means of a layer of coarse gravel and tile leading to a point below the bottom of the silo. The bottom and sides should be built of stone, laid in the best hydraulic cement. If stone cannot be had, hard-burned brick is the next cheapest good material. The bricks should be laid in cement and the whole inside and bottom thoroughly plastered with cement.

This may be of lumber and the roof of shingles; and if it is carried up one story above the silo, it will afford a useful workshop or room for storage of any kind. It will pay to finish the building in this way, as the extra expense will prove true economy in the end. The excavation may be mostly done with the plow and scraper, and the incline afterwards filled in by the scraper as the wall is built up.

A given weight of ensilage in a deep silo requires less extraneous pressure, and exposes less surface to the air, than it would in a shallow silo. For these reasons depth is important. If too deep, there is danger of expressing juice from the ensilage at the bottom.

TESTIMONY OF EXPERTS.

As to evidence from a large number of the best farmers of the

east and west, I have collated and condensed from replies sent the department of agriculture and published in a special pamphlet therefrom. From a great number of answers, the following facts are condensed, as bearing specifically on the various questions relating to silos and ensilage in the United States:

Where the ensilage is cut down in a vertical section for feeding a narrow silo has the advantage of exposing little surface to the air.

The silos reported vary in capacity from 364 to 19,200 cubic feet. If entirely full of compressed ensilage the smallest would hold 9.1 and the largest 480 tons, estimating 50 pounds to the cubic foot. Practically the capacity of a silo is less to the extent that the ensilage settles under pressure. This should not exceed one-fourth, though in shallow silos, or those filled rapidly and with little treading, it is likely to be much more. A temporary curb is sometimes added to the silo proper, so that the latter may be full when the settling ceases.

For walls underground, stone, brick and concrete are used. The choice in any case may safely depend on the cost. In firm soils that do not become saturated with water, walls are not essential to the preservation of ensilage. Above ground, two thicknesses of inch boards, with sheathing paper between (the latter said, by some, to be unnecessary), seem to be sufficient, if supported against lateral pressure from the ensilage.

A layer of straw or hay will serve in some measure to exclude air, but is not necessary. Generally boards or planks are placed directly on the ensilage. The cover is sometimes made in sections two feet or more wide; oftener each plank is separate. The cover is generally put on transversely, having in view the uncovering of a part of the silo while the weight remains on the rest. Rough boards, with no attempt at matching, have been used successfully. A little space should be allowed between the walls and cover, that there may be no interference as the settling progresses.

Any heavy material may be used. The amount required depends on various conditions. It will be noticed that practices

and opinions differ widely. The object is always to make the ensilage compact, and thereby leave little room for air, on which depends fermentation and decay. In a deep silo the greater part is sufficiently compressed by a few feet of ensilage at the top, so that there is small percentage of waste, even when no weight is applied above the ensilage. Screws are used by some instead of weights. The objection to them is that they are not self-acting, like gravity.

The cost of silos, per ton of capacity, varies from four or five dollars, for walls of heavy masonry and superstructures of elaborate finish, to fifty cents or less for the simplest wooden silos. Earth silos without wall can be excavated with plow and scraper, when other work is not pressing, at a trifling cost.

The cost from field to silo is variously reported from thirty-five cents—and in a single instance ten or twelve cents—for labor alone, to two dollars and upwards per ton; though the higher amounts include the entire cost of the crop, not the harvesting alone. There is a general expectation that experience will bring a considerable reduction in the cost of filling.

The ensilage should remain under pressure at least until cool, and be uncovered after that when wanted.

In nearly all cases the loss by decay was very slight, and confined to the top and sides where there was more or less exposure to air.

Generally the ensilage has kept perfectly for several months, showing no deterioration while any remained in the silo, excepting where exposed for a considerable time. It is better to uncover a whole silo, or compartment of a silo, at once, and thus expose a new surface each day, than to cut down sections.

Ensilage has been fed to milch cows more generally than any other class of stock, and no unfavorable results are reported. There can be little doubt that its great value will always be found in this connection. Several feeders consider it equal in value to one-third of its weight of the best hay, and some rate higher.

There is a marked increase in quantity and improvement in

quality of milk and butter after changing from dry feed to ensilage, corresponding with the effects of a similar change to fresh pasture. A few seeming exceptions are noted, which will probably find explanation in defects easily remedied, rather than in such as are inherent.

Ensilage has been fed to all classes of farm stock, including swine and poultry, with results almost uniformly favorable. Exceptions are noted in two statements, where it appears that horses were injuriously affected. It should be borne in mind in this connection that ensilage is simply forage preserved in a silo, and may vary as much in quality as hay. The ensilage that is best for a milch cow may be injurious to a horse, and that on which a horse would thrive might render a poor return in the milk-pail.

Cows giving milk are commonly fed fifty to sixty pounds with some dry fodder and grain.

The condition of stock, fed on ensilage, both as to health and gain in weight, has been uniformly favorable.

There is hardly a doubt expressed on this point—certainly not a dissenting opinion.

Mr. Samuel Adams, of Massachusetts, in relation to the method of feeding, says: "For milch cows I should feed fifty pounds ensilage, ten pounds hay; if shorts were not too high would feed two quarts per day, and if the dairy product was in demand would give a little meal of some kind."

My own opinion expressed at the time was that, in the west more grain and less ensilage would naturally be fed. When corn is used as ensilage we should recommend bran, mill feed and oil-cake in preference to the corn in the grain. A mixture of one-quarter prickly comfrey (strong in nitrogen), one-half corn fodder, and one-quarter rowen hay, with fifty pounds of bran to the ton of green fodder, will make a perfect food for milch cows. Then fifty pounds of ensilage and five pounds of corn-meal would make a rich ration for each cow. But in this every person must be guided by circumstances and personal experience. To return, Mr. Jason, Massachusetts, says: 'I fed

forty-five pounds of ensilage and five pounds of hay; from the 10th of January to the 10th of March, sixty pounds of ensilage and four pounds of middlings to dry stock, and two pounds more to milch cows; from the 10th of March until May 1, sixty pounds of ensilage, one foddering of oat straw, and six pounds of grain to cows in milk. He regards sixty pounds of ensilage, with six pounds of grain for an averaged-sized cow per day as a full ration.

Col. LeGrand B. Cannon, Vermont, fed an average of eighty-five pounds per head for three-year-old steers daily for five and a half months, with three pounds of grain daily. Cattle fed as stated made a greater gain and were in better health and condition than others fed on twenty pounds of chopped hay and three pounds of grain.

Mr. Wm. B. Eager, of Nebraska, fed forty pounds per day per head. The midday feed was of cut dry corn-fodder, or cut millet hay, with ground feed. Occasionally for a trial he fed meal upon the ensilage, but abandoned it and fed ensilage alone, and meal upon dry food or cattle would not eat it. The herd of over three hundred milch cows came out in better flesh than when taken from pasture.

Prof. J. McBryde, of Knoxville, Tenn., says: "All our milch cows receiving ensilage showed notable improvement in milk. Butter made from milk of cows fed on ensilage is of excellent flavor. Three yearling steers, fed exclusively on long forage, one weighing 428 pounds, received a daily ration of twenty pounds of hay, gained twenty-two pounds in twenty-eight days; another, weighing 457 pounds, received ten pounds hay and twenty pounds ensilage, gained twenty-eight pounds; a third, weighing 442 pounds, received forty pounds ensilage, and gained thirty-eight pounds. Two pounds ensilage gave better results than one pound hay. It is plain that animals should be fed on mixed rations of ensilage and matter rich in albuminoids.

Mr. W. L. Weeks, of Wisconsin, says: I feed milch cows from forty to fifty pounds at two feedings, morning and night, mixed with two pounds of corn-meal, and same weight of some

nitrogenous food, as oat-meal, barley-meal, or mill feed. At noon I feed hay, oats in straw chaffed, or barley straw chaffed, and stock always gaining in condition, coming out in spring in high flesh, and healthy. Since feeding ensilage I have had no trouble with garget or other unhealthy condition of udder. In my experience ensilage has proved a gain in profit of certainly 40 per cent. over any method of dry feeding that I know, besides enabling one to carry three times the amount of stock possible on the same amount of land with dry feeding.

Mr. John D. Whitman, of Iowa, testifies that ensilage is fully equal to half its weight in hay; the effects very similar to that of green grass, and extra good for calves.

If on full feed, seventy pounds per day is fed; a less amount with some grain and hay is better.

Mr. George A. Pierce, of Canada, says that ensilage is very valuable for dairy stock, entirely taking the place of roots and largely that of hay.

Immediately on feeding the ensilage the butter gained in quality and quantity. No fault was found by the purchaser.

Fed a few steers on ensilage and they did well; calves and young stock did remarkably well. He fed sixty to seventy pounds per day, mixed with meal. The stock began to gain as soon as they were fed ensilage; formerly had hay, roots and some grain. He found ensilage a great advantage over the system of feeding hay and roots in winter.

Dr. John G. Sutherland, of St. Louis county, Mo., was one of the first practical farmers in the west to adopt the ensilage system, after Mr. Morris' experiments had demonstrated its value. He kept thirty-two head of milch cows, which he fed on ensilage, both in the winter and in the season of scant pasturage at midsummer, making the ration fifty-five pounds per day of corn ensilage to each cow. This he supplemented with a sufficient quantity of dry food—chopped hay and bran—in winter, to keep the animals in good condition, but in midsummer little besides the ensilage was needed. His cows were always up to a full flow of milk, and the butter excellently flavored.

BUILDING AND COST OF SILOS.

Mr. Bisbee, of New York State, thus describes his plan of building: "The top of the silo is even with a plateau, the bank descending fifty feet to the stable, and very steep. The ensilage is taken out by a hoisting apparatus over the top of the stone wall, and carried in a car on a gently descending grade into a small house, built on the roof of the stable, where the bottom falls out and the ensilage drops to the floor over the stable. The silos were built double; seven and eight feet wide, respectively, by 24x15 feet deep. The material was stone. Outside walls dry, thirty inches thick at the bottom, and twenty at the top. Division wall twenty inches, laid in cement, and all walls plastered with cement. The walls were built by masons, in accordance with their notions of fitness, with the result of an extravagant cost. Above the silo walls is a curb of matched boards, six feet high, for settling room—of course a roof covers the whole. The silos were covered with hemlock planks, and weighted with stone fourteen inches thick, and earth banked at ends of plank. The cost was between \$700 and \$800."

Mr. N. Gridley, New York, has a silo 32x12x12 feet deep, built of concrete, 14 to 16 inches thick. Posts set in the ground and lined with two inch plank, put in as wall is built. Any kind of stone used. One part cement to five parts sand, mixed while dry, then wet so that it will pour from the pails in which it is carried. After the posts and planks are taken down the walls are plastered with cement, made with less sand. Bottom covered about two inches with gravel. The cost was \$200, including light frame building over it.

CONCLUSIONS.

In relation to the age of the crop, when cut, I think it is fully evident that corn may be allowed to become about mature before ensilaging. A partially developed ear does no hurt. The stalks are full of sugar, and towards the butts they are the

richest. Another thing is, we may put fodder into the silo with advantage after it has lost considerable moisture from milting, and this again, as I have stated, is only an old European practice revived. It still has succulence enough to be completely broken down. If 50 per cent. of the juices remain we have succulence enough. If we even wait until the ear is nearly ripe we lose no fair value in the stalk, unless, indeed, we cure the fodder beyond that point where there is not sufficient moisture remaining to re-establish the perfect succulence of the food. In fact loads of green ensilage corn have been alternated with corn shocked ten days, and the results were all that could be desired. Another thing contended for, and which has a reasonable share of correct practice is that a clay or loam bottom, moistened and pounded solid, is better than a granite bottom. I well know that such puddling will render a soil practically impervious. In conclusion I make no excuse for the short excerpts I have made from the *Farm, Field and Stockman*. They were written originally by myself, or by our correspondents. As a last word I quote a short excerpt from the *Country Gentleman*, written by a Western Reserve, Ohio correspondent, who says:

The silo itself has been greatly improved within the past two years, or simplified. From the massive pit of masonry, it is now found that it can be made of wood. The question now to be decided is one of durability. The wooden silo has many forms and systems—the one common to all being an inside lining of two thicknesses of boards, with tarred paper between, to make an air-tight wall. It was also found that such a wall was about or more nearly frost proof than a stone wall, as wood and tarred paper is not so perfect a conductor of frost as stone and mortar, and that sawdust should be wholly discarded as a packing for walls. To preserve the wood of the interior from decay by the action of the ensilage, various plans are adopted—painting the walls with heavy coatings of iron-clad paint, filling the the boards with linseed and coal oil mixed, and lath and plastering—the last the most successful, and likely to be generally adopted where wood is used. With some, it is thought that

if the inside walls were to be thoroughly whitewashed with water-lime paste, they would be very durable.

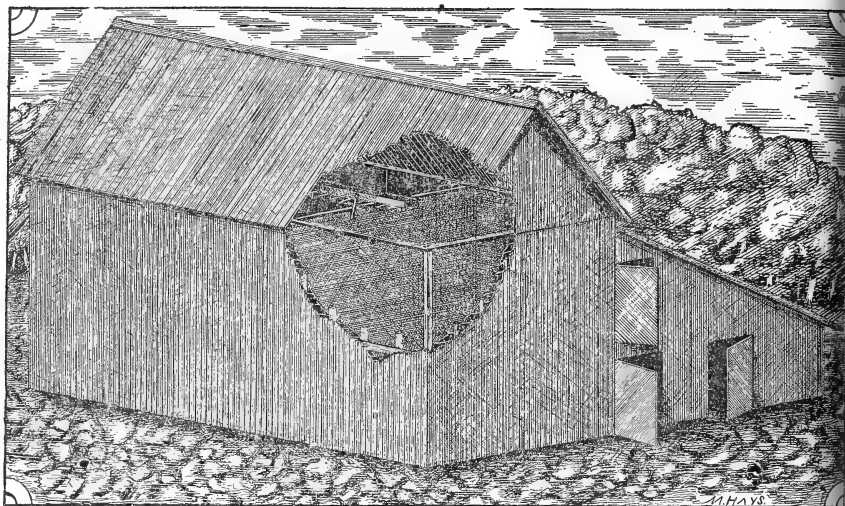
In covers for the silo, a radical change has been made, in the west, though it is noticed that the eastern farmers who have silos are still talking about heavy covers and great weights to keep the ensilage down. In the west the silo is usually covered by putting strips of tarred paper on the surface, then one thickness of inch boards, over which is then thrown four inches of sawdust, muck or greenish hay. In one instance, a silo was covered with a load of dampened straw, and over this a load of partially cured hay, and the ensilage came out "smiling"—the wet straw proving as perfect a conductor of as paper and boards.

The necessity for the great weight on a silo is not borne out by the facts. The slow filling and heating of the ensilage, now generally followed, expels the air, and its place is taken by a dilute form of gas, heavier than air. As the air cannot force out the heavier gas, all the need there is for a cover is to *seal* the ensilage until it is wanted. It is then safe to take the cover all off from the silo, and by feeding it uniformly from the top, keeping it level, the ensilage will be kept sound all the way to the bottom, even though its feeding occupies several weeks. The exposure to the air twice per day between feeds gives the ensilage a chance to free itself from those "noxious vapors that have prostrated strong men," rendering it a harmless ration, free from objection and a delight to the stock.

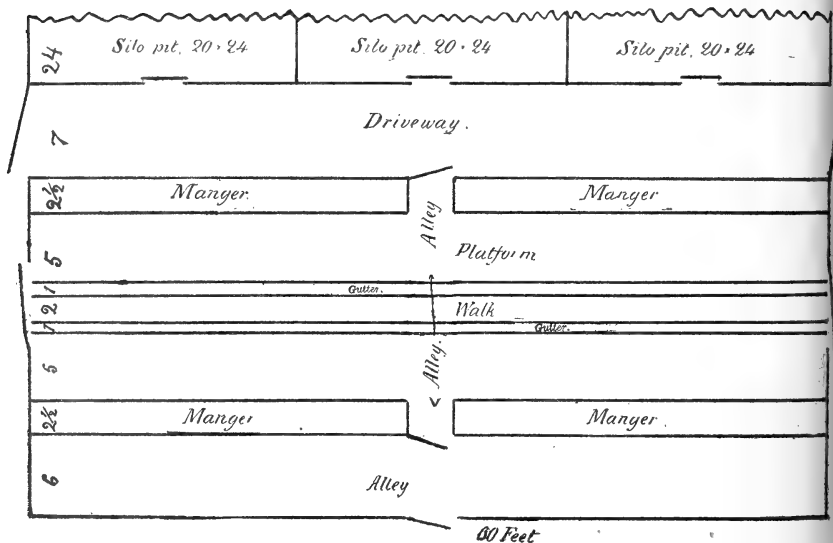
DISCUSSION.

Mr. Potter: "I would like to ask the gentleman's opinion of silos above ground?"

Mr. Periam: "Of course it is a question of convenience as to whether the silos shall be built above or below ground. Above ground we have got to provide against frost, and we can build them as we build our ice houses, filled in with any non-conducting substance. If such wall is impervious to air it makes no difference and it is only a question as between lumber and stone whether you build your silos above ground or under ground."



H. B. GURLER'S SILOS AND STABLE.



GROUND PLAN OF ABOVE.

Mr. Potter: "During the month of September, while Mr. Gurler, of DeKalb, was filling his new and larger silo, I visited him, and as he cannot be present I will try and give you a short description of it. It was built on a gentle slope, entirely above ground, and was constructed as follows: The lot was first drained with four inch drain tile, laid about two feet deep around and outside of the foundation. The size of the building was 60x60, 24 foot posts; but as a portion of it was used for stabling and feeding cattle the silo proper was 28x60. This part had no walls, or sills, but instead a trench was made, filled with grouting, and on this 2x10 inch planks imbedded in water lime cement. The studding were 2x10, placed 18 inches apart, with girths about six feet apart. It was first sheathed on the inside with common boards surfaced to a thickness. On this was placed tarred paper, then lined with fencing flooring. The outside was sheathed and sided with drop siding. There were no floors, but the foundations, both outside and in, were cemented, and should judge, eight or ten inches above the plank that served as sills and against the sides to render them air and water tight. The inside had two partitions running across it making three compartments 20x28 each. The partitions were two inch plank with two or three three-fourths inch iron rods running through and bolted to the girths to prevent spreading when under pressure. The ground was leveled off smooth and the ensilage run onto that. His manner of covering and weighting was simply to put tarred paper on top of it, then a layer of loose boards, and on this oat straw, or any coarse fodder. He does not consider it as essential to put heavy weights on it as many do."

Mr. Hostetter: "How does Mr. Gurler get his ensilage in his long silo? Does he move his feed cutter from one end to the other?"

Mr. Potter: "No, sir. He has a door on one end up near the gable about three feet by five feet. His horse power and feed cutter were set about 25 feet from the building. A platform was built behind the cutter and the corn (which was

drawn direct from the field) cut into about one-inch pieces and elevated with a carrier similar to those used on threshing machines. This discharged it onto a horizontal push conveyor, running from the door to the center of the further bin. This conveyor was made of dressed boards about eighteen inches wide on the bottom, four inches on the sides, and was suspended from the rafters. Over the two first bins were trap doors. The belt, which was, of course, an open endless one with cleats, would shove the feed along to the first trap door (open) until a sufficient quantity was run in. The door was then closed and the feed conveyed to the second door, then to the third, or the further one.

Mr. Gurler thinks it better to cut the corn one or two days before using. Allow it to wilt, and then run a portion in all of the bins each day and allow them to settle about even. The power by which the horizontal conveyor is driven is obtained by connecting the ends of the two carriers near the door with a chain or link belt and pulleys. As his field was some distance from the silo it required three teams to draw the feed to the platform, and about twenty men to run it to advantage. With this force they could put up about six tons per hour. Mr. G. estimates the cost of cutting, drawing and putting it in at about \$7.00 per acre, which is only about \$2.00 per acre more than it costs him to put the same in shocks."

President: "What kind of corn does he use?"

Mr. Potter: "Ensilage corn. I think he put in a little native corn, but not much."

Mr. Boyd: "How much did he cut to the acre this year?"

Mr. Potter: "I did not ask him but he had a good crop."

John Boyd: "I think that underground silos are impractical on prairies, and I think that silos built above ground can be built cheaper and practically, just as good. I built mine above ground because I had no means of doing anything else. It is 20x32 feet in three compartments and I have a platform built in front. There's only one door to the building. The platform is 4½ feet high from the ground, and the building is all tight as

far up as the platform, the doors commence from the platform up. There's about three doors from that up, 16 feet high. We drive up to the platform with a load of corn stalks and feed them from the platform, right into the feed cutter, that is carried up 16 feet by the straw carrier and another straw carrier takes it from there and empties it into a pit. We get the straw carrier right over the center of each one of the pits and when we want it in the last pit, we close the two first trap doors. When we want to empty into the second pit, we open the second trap door and close the first one; when we want to empty into the first pit, we open the first trap door; it is a very simple operation. By doing that we avoid the difficulty of changing the feed cutter and the horse power every time we want to shift from one pit into another. Mine worked very well, though we did not cut quite so much as Mr. Gurler did; the most we cut was about five tons an hour, and we couldn't keep that going right along. We would fill one day in one bin, the next day in another, and the third day in the third bin, and then commence in the first on the fourth day, and in that way it took us about four weeks to fill the silo."

I find that my cows won't eat such large quantities of ensilage as mentioned—fifty, sixty or seventy pounds a day. The most I can get them to eat is thirty-two pounds per day.

Question—"Was your corn planted thin enough to have many ears on?"

Mr. Boyd: "Oh, it had ears on; sometimes three ears to the stalk; it was ensilage corn, Virginia corn."

Mr. Potter: "Perhaps that had something to do with the difference in the weight."

The President: "There are some of us who are not entirely satisfied of the utility of the ensilage and the practicability of building silos. Now, Mr. Boyd, won't you tell us what you think of them? talk just as you would if you wanted to sell the right to make ensilage, and then we will learn the advantages of it."

Mr. Garfield: "Oh, I object. We want him to talk as a candid man."

Mr. Boyd: "My experience has not been very extensive with the silo. This is my first year, but so far as I have gone I can say with perfect candor, I think I am feeding my cattle at one-half the expense it has ever cost me before, with better results. I am feeding thirty-two pounds of ensilage in two feeds a day, with two quarts of bran and one quart of corn-hearts, and one pint of oil-meal, and in the middle of the day the cows get hay, and my cattle look better than they ever did; they are producing better than they ever did before. I am taking from three cans of milk, one can of cream, and the cows look in better condition. I consider it a great thing; the cheapest feed that I ever tried by a long ways."

The President: "Would you advise every farmer that keeps from ten to thirty head of cattle to invest in a silo, even if it cost him \$500 to build it?"

Mr. Boyd: "Well, sir, mine did not cost so much as that. I consulted Mr. Gurler before I built mine and it cost me about \$400, and it holds about two hundred and ten tons of ensilage. The way we put it in, alternating in filling the bins, it don't settle very much after it is once filled. I did not put any weights at all on mine, but another season I will put cut straw immediately on top of the ensilage. I find that the evaporation from the ensilage causes considerable decomposition on top; about three inches of my ensilage I had to give to my pigs; the pigs ate it. Ensilage is splendid for the hogs. I fed it to young stock only two months old."

Mr. Potter: "Do you put on any weight or cover at all?"

Mr. Boyd: "I would not put any weights at all on it. I would put a foot of cut straw on it in order to absorb the moisture as it comes to the surface, then I would cover it with boards and put tarred paper on top of the boards."

Question—"Did you wilt your corn?"

Mr. Boyd: "Yes, we were caught in the rain when we

were harvesting and some of it was out in the field for ten days, but it didn't do it any harm."

Question—"How much hay do you feed at noon?"

Mr. Boyd: "A very small ration of hay; we were pretty short on hay; we did not get more than one ton where we got seven ordinarily, and we have been very saving of it."

Mr. Stockwell: "About how much help did it take when you were putting in your five tons per hour?"

Mr. Boyd: "I started to cut it with a reaper and found it did not work. Every once in a while the long stalks would fall back again and it would cut off about a foot at the end of it. Then I had a lot of women come and cut it with knives; they would lay it down and cut it right along, and I found four women could cut it as fast as we could put it in."

Mr. Garfield: "I am somewhat confused as to what constitutes a ton of this ensilage. I hear different men speak about different quantities—forty pounds, fifty pounds—and it strikes me it would take about a thousand cubic feet to make a ton of it."

Mr. Boyd: "I calculate fifty cubic feet to the ton. I have measured pretty carefully and I think that is it from the way we are feeding it out from our bins. I have each foot marked on the boards, and as we feed out I know just exactly how far down we have gone in the pit. When I speak of a ton I mean a ton of packed stuff. In filling the bins we try to scatter it and tramp it down, and after it is once settled the lateral pressure becomes relieved to a large extent."

Mr. Little: "My ensilage settled over four feet from the time I left it until I came to take the covering off. On top were two or three inches spoiled and on the sides and in the corners it ran in still further, and it was so badly spoiled that my buttermilk pigs would not look at. It was as black as the ace of spades, if any of you know what that is. I don't think there is any animal on earth could eat it; but, of course, an inch or two on the outside is a small matter where a man has such a large quantity."

The President: "What do you think of the business—is it a big thing?"

Mr. Little: "I think so."

The President: "Going to keep it up?"

Mr. Little: "Certainly, I will."

The President: "Going to build another?"

Mr. Little: "I think not, because I keep very little stock and I have got enough now for two years. I built this silo for no other reason in the world than to show to my patrons. I would say to my patrons, 'You will have to build a silo,' and they would say, 'If it is a good thing, why don't you put up one yourself?' And I told them finally that I would do so, and when they saw the corn growing and the thing started, they began to say, some of them, 'We will have one next year.' Many didn't believe in it very much, but they promised to come and look at it. After I built it they showed considerable interest, and now every day some of the neighbors call to see this silo and they are well pleased and are going to have one."

Mr. Garfield: "How many men did you have to do the tramping?"

Mr. Little: "We didn't tramp it at all, only a little around the edges. We put it in regularly about every other day."

The President: "But no tramping?"

Mr. Little: "Only about the edges."

Question—"What kind of corn did you use?"

Mr. Little: "Ensilage corn."

Question—"Do you know where that comes from?"

Mr. Little: "I don't know for certain, I always supposed it came from Virginia; regular Virginia sweet corn."

Mr. Sawyer: "While you are on that subject, I have some figures which are just as I set them down while I was plowing the land and cultivating the ground and planting the corn and filling the silo. The whole cost of raising the corn, including the rent of \$3.75 an acre on four acres, was \$29.00. I had that to draw half a mile to the silo. The hauling, cutting and everything complete, cost \$43.75 for putting it into the silo. The

whole cost of the ensilage, seventy-five tons in the silo, was \$74.00 out for the seventy-five tons in. I had but one pit and I found that there was more spoiled than there would have been if it had been divided. My corn was hauled in directly from the field green."

The President: "I want to ask Mr. Periam about this which they call ensilage corn; what is it?"

Mr. Periam: "Ensilage corn is a southern corn generally that grows to stalk pretty well. As we all know, the further we go south, the higher the stalks of corn grow and the less ears they produce, but it is pretty well furnished with leaf surface and that is what gives the plant its value. What we call ensilage corn has a good deal of leaf surface."

The President: "Well, does that corn brought from the south produce more leaves in the north than it will if it were planted right in the south?"

Answer—"Yes, all plants do. They produce more leaf surface in a given time in a temperate climate than they do in a southern climate."

Mr. Boyd: "What we understand to be ensilage corn does not produce any more leaf than northern corn. There is a good deal of stalk and a good deal of ear; I have had three ears on a stalk."

The President: "There is a kind of corn that some parties claim they almost have a patent on; it is about two dollars per bushel, and there's another kind of corn that is said to be grown in the garden adjoining that is offered now at very much less per bushel. Now, the question is, is it the same thing?"

Mr. Boyd: "I am not quite satisfied in my own mind that even southern corn is the best corn for us to put in the silo. I I don't know but our common northern corn would be just as good."

Mr. Potter: "Burrell & Whitman claim to have made a good specialty of corn for ensilage purpose and that it is superior to all other corn. Mr. Gurler last year procured some of the B. & W. corn and some other (obtained at St. Louis), planted both,

and says there is not near the difference between them that many claim. He thinks he shall use some of both another year."

Mr. Sawyer: "They claim that this corn will not mature in this state, or in this northern climate. Now, I know this is a mistake; I live in the southern part of the state, and any corn will mature down there."

Mr. Harrison: "There is no doubt that the ensilage corn is what we want for the silo for this part of the state, because it grows great big leaves. I sent for two bushels and a half and planted it for the silo. When that seed run out I planted a large, yellow corn, which was good corn for the silo, having a large stock. Then I planted a small hard flint, yellow corn; you could see just exactly where the three kinds of corn were planted. The ensilage corn was considerably ahead of the yellow corn—I think, perhaps, one quarter more tons to the acre than the big yellow corn."

Mr. Sawyer: "Any big white corn in the south will do just as well as B. and W. corn."

Mr. Potter: "I think there is more juice, more value in ensilage corn than there is in our native corn."

Mr. Garfield: "I am satisfied Mr. Potter is right about that. I am feeding both kinds. There is a peculiarity in ensilage corn. The stalk is not near as tough as that of our common corn, and it holds more of its moisture, and therefore seems to produce more milk."

Mr. Hostetter: "This ensilage corn don't ripen here; it is very green. I am using it now, cutting and feeding it, and it is so green that we cannot cut more than enough for four days or it becomes very hot; it is very green and soft. I have stacked some of it as an experiment, and I am satisfied it is so green that it will heat in the stack, and that is one reason the cattle like it so much better than the other corn, it is green and juicy, like green corn almost."

Mr. Garfield: "I believe it is better to plant this corn a little thin so that it shall ear out and develop the sugar quality to a greater degree."

The President: "What do you mean by a little thin so it will ear out? Mr. Boyd, what would you say?"

Mr. Boyd: "About eight inches apart."

Mr. Sawyer: "Does Mr. Garfield cut both varieties of his corn at the same time, or did he cut his yellow or native corn early, when it was in that same condition in which his ensilage corn was when cut?"

Mr. Garfield: "We cut all of the native corn first, beginning about the middle of August, and it was some time past the middle of September before the other was cut. I think the yellow corn was further matured because it was further cured."

Mr. Warne: "I had about seven bushels of this southern white corn planted. One man planted, he said, about three pecks to the acre; the other man planted nearly a bushel; three acres with two bushels and three pecks. That ground had been a lake swamp about forty nine years. There were ten acres in the lake and I tilled it up. From the day this southern white corn was put in the ground it averaged two inches growth a day until it was cut up. There's numerous stalks, measuring fourteen to sixteen feet, with two ears more than ten feet from the ground. The men cut it up and they carried a step-ladder with them, and stood on the step-ladder to tie the shocks."

Question—"Wasn't it due largely to tiling?"

Mr. Warne: "Yes, of course; it was rich land. I have taken and twisted up a stalk of the southern corn and tasted of the juice, and it was like maple syrup in comparison with the juice of the native corn, and I didn't blame the cows for making a distinction and dropping the native corn and picking up the other. The cattle would eat every stalk of the southern corn clean up, and they are large stalks some of them. One of the men who planted this corn has about half a bushel of matured corn saved, which he is satisfied will grow. I think if we would plant the corn thin on rich land that we could get seed from it."

Mr. Harrison: "This gentleman lives in Kane county, and he says if it were planted thin on rich land he could get seed. Now, in behalf of Carroll county, we got seed last year. I

want to say: We got two bushels of ensilage corn and put it on four acres of land, and we got about twenty bushels of seed corn."

The President: "Would you dare plant that corn here again expecting to get such a yield?"

Mr. Harrison: "Well, I planted about ten or twelve acres of that corn this year, but planted it so much thicker that I did not get any seed at all. The first corn we planted two bushels on about four acres."

Mr. Potter: "There is no doubt but the seed from this corn will grow if matured in a favorable season, but Messrs. Oatman Bros., of Dundee, (who have tried it) inform me that it soon acquires that woody fibre, and after growing it two or three years it was no better than our northern corn."

The President: "You think, then, it would be more profitable to pay more for the seed and get the corn fresh from the south each year?"

Mr. Potter: "It seems to me it would be poor policy to use corn raised here and run chances when the difference in the cost of the seed is comparatively so trifling."

Mr. Harrison: "As regards the difference in the quality of the stalk, we found it was not discernable. I have read about the corn deteriorating by endeavoring to raise seed from it in the north, and am not ignorant of what has been said on that point. Consequently I noticed that in particular. In just one year's time we would not expect great changes, of course, to take place, still we might expect them to be discernable before we would make a very great distinction in paying two dollars for our corn. I think it is safe to raise your own seed for several years; perhaps at the end of five years the difference would be so great that it would be better to start fresh again. I don't believe it is any more true of this ensilage corn than any other kind of grain that it deteriorates from constant planting in the same place."

Mr. Boyd: "That is not true of corn. It is true of oats and wheat, but it is not true of corn. You can hold up your corn

and increase the quality of it. I have tried it a dozen years. I have raised corn that I bought in southern Tennessee that had eight ears on a stalk. You can breed corn just as you can cattle or horses, or hogs, and improve it all the time."

A. B. Hostetter: "The statement has been made here that in the ordinary way we waste one half the produce. Now, we have a great deal of corn in this country, and I would like some of these gentlemen who have had experience in ensilage to tell us whether the value of the fodder which is wasted will pay for the expense of the silo and put the corn into it over and above the expense of ordinary fodder."

Mr. Periam: "It is simply a question of policy and economy. Where you are feeding dry feed you do not get the full assimilation of that food. Of course, with grass in its natural state, you get the full solution of the feed, and that is just where the practical value as between ensilage and dry fodder lies. You have to give a cow that gives a big flow of milk from seventy to one hundred and fifty pounds of water a day on the dry fodder in order to moisten that dry fodder to such a degree that the digestive organs can operate upon it, and the absorbents of the system take it up. The question of the capacity of silo came up, you remember. Now, a silo ten feet square will hold a great deal of stuff. You multiply that ten by ten and you get one hundred square feet, you multiply that again by ten and you have got one thousand cubic feet in that silo. Your ensilage weighs fifty pounds to the cubic foot, and if you divide this one thousand cubic feet by fifty, you get the number of tons in the silo. You get twenty tons in a ten foot silo, and you can easily figure up in that way."

The convention adjourned to meet at two o'clock P. M. the same day.

AFTERNOON SESSION.

The convention met pursuant to adjournment at two o'clock P. M. same day.

ENSILAGE.

J. Y. SAWYER, Godfrey:

It was our intention to confine ourselves to the money value of ensilage compared with our present system of dry feeding; but at the request of your secretary to commence at the rudiments, we will take a few moments to give you a history of this wonderful feed:

In 1850, M. Auguste Goffart made some experiments in the ensilage of wheat at Versailles, France, and in 1852 he built four under-ground silos, made of masonry and cemented. These silos he filled and emptied several thousand times, using maize, Jerusalem artichoke, beets, sorgo, turnips, potatoes and straw to experiment with, his object being to preserve the plant in its natural juice, which was lost in drying. His method was to cut the maize into six inch lengths, place a layer of this in his silo, covered by a layer of straw, and so on till filled; a covering of earth was then put on. Upon opening, the earth was found to have arched, leaving a place between the earth and the feed. Here the ensilage was being damaged by the action of the air, and was only saved by its immediate use. Later he covered with boards and weighted with stone, but the process was imperfect till he reduced the amount of straw and cut the feed very fine, when it was found to keep an indefinite length of time. This was the summer of 1873—success after 23 year's labor. Goffart at once made known to the world what he had found, not the method of building silos and filling them, but the process of preserving feed in its natural juices, by continual pressure.

In 1876, while we were celebrating our great Centennial, Francis Morris, of Oakland Manor, Md., was building the first silo in the United States, he having read of Goffart's success, in

a French newspaper sent him early in the year. These silos were built of brick; built inside his barn after the corn was planted, and were twenty-five feet long, four feet wide, and ten feet deep; were filled October 1st, with corn cut fine, covered with straw and boards and weighted with stone. Christmas day was celebrated on this farm by opening the silo and feeding the ensilage to cows, horses, mules, sheep and hogs; most of them eating it readily, and preferring it to the best of hay. Since 1878 Mr. Morris has increased his silo capacity to 1,000 tons, which is evidence enough to show what he thinks of the system of ensilage.

Mr. C. W. Mills, a grain merchant of New York, familiar with all kinds of wheat and corn, was fascinated with the luxurious character of some species of southern corn and determined to try the experiment of hybridizing this with the northern variety, so he planted on his farm at Poinpoint, N. J., alternate rows of northern and southern varieties. This was in the spring of 1875. When September came, his northern crop was ripe and ready for harvesting, but the southern variety had just got fairly to growing, and showed no signs of maturing; what was he to do? If frost came his crop would be lost. The old adage: "Necessity is the mother of invention," proved true. Mr. Mills had heard of the method of keeping roots by burying them in the ground, so he dug pits, filled them with green corn, covered with boards and heaped earth upon the boards. When the pits were opened, the feed was found to be in a tolerably fair condition; the stock ate it readily, but portions of it were mouldy, and as the pits were disturbed decay went on rapidly. This experiment could hardly be called a success from a financial stand-point, but it furnished the key which unlocked the secret of preserving green crops in silos—one of the grandest inventions of the century. In 1877 Mr. Mills built two silos of 600 tons capacity, which he filled with corn and made a complete success of the system of ensilage without ever hearing of Goffart or Morris. Thus the ball was started rolling, gathering mo-

mentum on its way until there is hardly a state in the Union without its silos.

Probably the first silos in this great Mississippi valley were built by Dr. Eager, of West Point, Neb., in 1880. His four silos were each 60 feet long, 16 feet wide and 20 feet deep, with a united capacity of 2,000 tons. The doctor says corn ensilage costs him 92 cents per ton, and is cheaper than prairie hay that can be had for the cutting and stacking. The honor of Illinois' first silo, we think, belongs to Oatman Bros., of Dundee, built in 1881. Mr. J. R. Barrett, of Sedalia, probably built the first silo in Missouri in 1883 and another large one in 1884. Mr. B. feeds 120 milch cows and 112 mules on ensilage. In 1880 there were but 5 silos in the United States; in 1882 there were 1,000. Between 700 and 800 were built in Great Britain alone in 1883-84—all this going to prove the success of the system of ensilage.

The location of the silo is a matter to be well considered. A steep side-hill sloping to the south or southeast is the most desirable, having the cow stable and entrance to silo on the warm side of the hill, a very important feature when the thermometer ranges from 15° to 30° below zero. The object of the side-hill is drainage and convenience in filling; also removing ensilage from silo, thus saving all elevating. Many good silos are constructed inside the barn by excavating beneath, or simply boarding up a portion of the barn. If the ground is flat, going too deep must be avoided, as the surface water will soak in and do damage, unless carried off. The material used may be wood, brick, stone, concrete, or even earth silos have been used to good advantage for several years. Where sand or gravel are near, it may be found that the concrete wall is the cheapest; only cement enough is needed to separate the particles of sand, and this serves as the mortar to hold the coarse gravel or stone together. The work may be done by farm hands, except the plastering, which is quickly done by a mason. The plastering, we consider an important part, as it keeps the air and water out, and makes the walls perfectly smooth. Very large silos should be avoided as they leave too much surface

exposed to the air while feeding. Better build them longer with cross partitions, and more of them, if much stock is to be kept. A silo 12x12x15 feet deep is a very convenient size, and will hold 43 tons, enough to keep 10 cows five months exclusive of other feed, but if supplemented by a little hay or fodder will keep 14 cows the same length of time.

Ensilaged feed varies greatly as to quality, depending largely upon the crop when cut; length of cut; weight applied; condition of silo, etc. The subject of sweet ensilage has attracted a great deal of attention the past few seasons. The manner of making sweet ensilage is to fill the silo slowly, and allow it to heat till it reaches 130° or hotter. This temperature destroys the bacteria and leaves the ensilage entirely free from acidity. The cutting should be fine. Mr. Goffart says the best ensilage he ever had was cut 3-10 inches long, while a neighbor of his cut 2½ inches long and had very poor ensilage; other conditions being the same. Our feed, this year, was cut one inch long, and would have been better if cut one-half that length; it packs closer and the air does not work in so much from the exposed surface while feeding. The weight should be put on soon after the silo is filled, and may be of anything that has weight; stone is generally used, as it is cheap, convenient to handle, and can be thrown out without being damaged by sun and rain. Earth is sometimes used and has the advantage of serving both as a cover and weight. The amount used varies, some use 50 lbs. to the square foot of surface, while others 200 lbs. We think 100 lbs. none too much.

In filling the silo the ensilage should be dropped as near the center as possible, being spread and tramped as fast as filled. The cover may be of plank, board, tarred paper; even earth thrown on will mix with the ensilage very little, and will follow the feed if it settles more in one place than another. In feeding, the ensilage is usually taken direct from the silo, but in cold weather a better way is to take out enough for the next day's feed, mix bran or whatever grain is to be fed with it, and place in a close box with a cover. If the ensilage is frozen any, I add

to it a little boiling water. The next morning the feed will be steaming and the way stock goes for this warm food is a caution—in fact, I myself, prefer hot pancakes, coffee and meat to a cold breakfast of the same, even if scientists say there are more “solids” in the cold than in the warm victuals.

Corn is undoubtedly the best crop for the silo, as it makes fine ensilage, and more can be raised on an acre than of any other crop, 25 tons being not an unusual yield. Burrell & Whitman say they have raised 80 tons of corn to the acre, in the Mohawk valley. This sounds a little “fishy,” we admit, but stalks from Kansas were exhibited at the Centennial that measured 30 feet in length, and we all have seen and raised stalks that were from 12 to 15 feet high; it would not take many hills of this kind of corn to make a ton. If we raise 15 tons on an acre, we have enough to keep a cow and her calf all the year round. Clover makes a very good ensilage and is a grand fertilizer. From 10 to 12 tons can be raised from an acre, at the same time greatly improving our land that has been worn out by excessive wheat growing. It is also very convenient to have silo of clover ensilage to supplement our pastures during the drouth of summer, and happy are those who had such silos the past season. Rye is extensively used in the east, as a crop of corn and rye may be taken from the land the same season, but those who have been farming in this way, now say by plowing rye under in the spring, more feed can be raised from the corn following than from the two crops. Sorghum is a great foliage plant and we think could be siloed profitably, but have never tried it. For young stock a mixture of other feed is unnecessary, but for dairy cows a little bran and corn meal may be profitably fed, also a light feed of hay or fodder. Dry feed may not increase the flow of milk, but it is relished by the cows and makes more cream—a matter of importance to butter-makers and those selling cream.

There are many objections offered to this system of feeding, some of which we deem important to notice:

First—*Silos Cost Too Much.* Dr. Pratt, of Elgin, Ill., says:

"Anyone who can dig a trench 5 or 6 feet deep; fill it with cut feed; weight it with a foot of earth, and cover it with a few loads of straw or swamp hay, will get just as good ensilage as though his silo cost him \$1,000.

The cost of the silo is an important matter, and the more we have to do with ensilage, the less money we put in silos. They are being made more cheaply every year. The idea that a few pinholes in the wall would ruin your ensilage, is fast fading away. In fact, some are simply stacking their feed, and weighting heavily and find only a few inches of the outside spoiled. Our own silo of concrete cost us about \$1.50 per ton capacity for the material and we did the work ourselves. Mr. O. C. Davis, Richland county, Wis., has a silo built of wood, 112 tons capacity, costing \$125; R. P. Gilbert, Oswego county, N. Y., has one of stone, costing \$700, of 600 tons capacity; L. C. Morse, Sparta, Wis., has one inside his barn that cost \$85, and holds 80 tons. Now, look at the cost of our hay barns: W. D. Hoard, of Ft. Atkinson, Wis., puts the cost of a hay barn at \$7 per ton capacity; take the case of Mr. Gilbert, whose silo holds 600 tons; he must have a barn that holds 200 tons of hay to have the same amount of feed. This will cost just \$1,400 instead of \$700 for the silo. Take the same case and see the amount of land it will take to produce 200 tons of hay. At $1\frac{1}{2}$ tons per acre, it will take $133\frac{1}{3}$ acres; the same land will produce 15 tons of corn per acre, or it will take forty acres to fill a silo. We could enumerate such cases all day, but will not take your time.

Second—*Too Expensive a way to Handle Water.* I admit that a load of green corn is heavier than the same bulk of dry stalks, but you take the juice from the green corn and it is lost forever; its equivalent can never be replaced by steaming or any other process, and the stalk that was filled with juice is filled with pith, of no more nutriment than a dry corn cob. Francis Sutton, Chemist to the Norfolk Chamber of Agriculture, England, says: "By far the most valuable feature of ensilage is the preservation of the juices of the plant in a soluble

form, and apparently in a more nutritious condition than it exists in the fresh plant. It must be conceded, I think, that if even the silo only enabled the stock-feeder to preserve the food in as good a state as when fresh, it would be an inestimable boon, but a comparison of the analytical results between fresh and ensiled maize and grass, points to a still further gain in the improved condition of the material so far as its assimilable properties are concerned." By actual experiment it has been shown that a cow will eat from 70 to 80 pounds per day of blue grass two inches long; this grass, as cut with a long mower and thoroughly dried, will be found to weigh from 16 to 20 lbs. to the hundred. Feed this to your cow for a week and you will see a great loss in milk, as also in the weight of the animal herself. A ton of well cured hay contains about 1,800 lbs. of solid matter while a ton of ensilage only has about 300 lbs. of solid matter, yet it is a fact that three tons of the latter is equal to one ton of the former in feeding value. We consider there is no more difference between a nice ripe peach or apple, and the same fruit dried, than there is between ensilage and the dried fodder as far as its digestibility is concerned.

Third—*Cows will not do as well Afterward.* In answer to this objection, we will simply relate our own experience: The 23rd of April we turned our cows on rye and clover pasture; two were fresh during the winter; the other three had given milk since the summer before. The five head had been making from 25 to 30 pounds of butter per week. The first week they were on grass, they made 44½ lbs., and did not make less than 42 lbs. any week in May; they would eat 12 or 15 lbs. of ensilage after being on grass all day.

Fourth—*Makes bad Milk—Butter will not Keep.* We have used milk on the table for four years from ensilage fed cows, and have never had nicer milk and cream for table use, being entirely free from that bitter taste, which milk from farrow cows sometimes has. Never had a complaint from a butter customer, though one lot was shipped to Texas in December, and the last used in March, said to have kept well in that warm climate.

It is not an unusual thing to see butter carry off the first prize made from ensilage fed cows.

Fifth—*The Work Must be Done in a Hurry When Help is Scarce.* There is a misapprehension in this, as putting up ensilage in a day is not necessary, but rather a detriment to the success of the process. Recent experiments have revealed the fact that silo may be days, and even weeks in filling, and still contain the best of ensilage. While the silo is open it should be trampled every day, or better still, fill in a foot or two of feed.

We now come to a part in the discussion that is of interest to every dairyman and stockgrower, namely: The cost and result of feeding ensilage, as compared with other kinds of feed. For this purpose we have taken (Jan., 1885,) twelve patrons of the Godfrey creamery, who feed and care for their cows well; one-third being fresh in milk, while ours are old in milk but one.

Now compare cost and results. These patrons feed hay at \$7.00 per ton; clover at \$5.00 per ton; sheaf oats at 20 cents per dozen bundles; corn-fodder at 12½ cents per shock; corn at 35 cents per bushel; wheat screenings at 15 cents per bushel, and bran at 11 cents per bushel, making a daily cost of 9 cents per cow. This, you will observe, is very cheap feeding; cheaper in fact than we have ever known it to be at this time of the year. Our cows were fed ensilage at \$1.60 per ton; clover hay, corn-fodder and bran at a daily cost of 7 cents per cow; a gain of 2 cents in favor of ensilage. Now for the result: The 60 cows fed on dry feed produce 30 gauges of cream per day at a cost of 18 cents per gauge for feed; the 6 cows fed on ensilage produce 5 1-10 gauges of cream at a cost of 8¼ cents per gauge for feed, a gain of 9¾ cents per gauge in favor of the new system. These figures were not taken from one day, but include the whole of the month of January, and should they be taken next January the gain would be nearly double in favor of ensilage, for dry feed is just twice as high now as it was then.

December 31 we weighed our milk and had 93 pounds; January 31, 92 pounds; February 28, 79½ pounds; not be-

ing quite satisfied with this we weighed again the next day and had $82\frac{1}{2}$ pounds; a decrease of not more than 2 pounds per cow during two of the coldest months Illinois ever saw.

We heard one of said patrons say, while chopping fodder out of ice and snow with an axe: "I wish I had your silo during this weather." Another said: "I have to keep my boys out of school nearly every pleasant day to haul feed." Encouraging for the boys! Do you blame them for wanting to leave the farm and get a comfortable position in an office or store? Ensilage is the boy's friend, and no man who has ever had the benefit of a good silo will willingly do without it.

J. Y. SAWYER, JR., Godfrey, Ill.

DISCUSSION.

Mr. Warne: "Did you see the corn stalk thirty feet high?"

Mr. Sawyer: "I saw corn at the Centennial from Kansas, and the statistics say that corn was there which measured thirty feet long."

Mr. Wilbur: "I would like to ask what is the difference in value of an acre of corn put up as we ordinarily put it up in the dry shock and cured, and that put up by ensilage?"

Mr. Sawyer: "I cannot give you any figures. I can give you the difference between hay and ensilage as I give it here. Nine hundred pounds of ensilage is equal—and I think any man here that has ever fed ensilage will say he prefers it—to the best ton of hay he ever saw. A ton of hay is 1,800 pounds solid matter. Three tons of ensilage has but 900 pounds of solid matter. That looks like a good deal of difference, but look again: That hay as it goes into the cow's stomach must be thoroughly masticated; must be warmed and soaked, and it takes that much more hay to get the 900 pounds ready to be distributed throughout the body. In feeding green, good ensilage, you have it already warmed, already soaked, and put in the silo and taken out in the very best condition possible as far as assimilation into the system is concerned, and there is where the great point

is. I cannot tell you exactly just how much difference there is between green corn and dry corn, but it is nearly one-half for the reason just given."

Mr. Hostetter: "Prof. Henry and Prof. Sanborn and other leading men have said that an acre of dry corn contains just as much nutriment as an acre of green corn-fodder or ensilage; isn't so?"

Mr. Sawyer: "Well, in the first place, you dry the juice out of the plant, and that juice cannot be replaced in any way, shape or form. The nearest you can come to it is to steam it and give it a very slight acidity, but you cannot quite reach it. The great value of the green corn or the ensilage is that it is in perfect condition to be assimilated. Some people go so far as to say that ensilage is better than grass, but this probably refers to poor pasture where a cow has to work hard all day to get filled up, but where you have grass in the very best form. I don't say that ensilage is better than grass, but say it comes right up to it."

Mr. Warne: "How much will ensilage shrink?"

Mr. Sawyer: "It has been claimed by chemists who have tried the experiment that only 1 per cent. of the moisture has been lost, but that is where it is cut at once and taken immediately, and placed in the silo without any curing at all, and I do not believe that is the best way. You hurry it too much."

Mr. Pape: "Suppose I was going to fill a silo, and had a lot of bright wheat straw, and should put in part corn and then straw, and fill with corn and straw all through the silo, what would be the result?"

Mr. Sawyer: "You would stand a very good chance of losing the whole, for the simple reason that every bit of straw you put in there is filled with air, and that is what you want to get out of your silo. By putting it all green in there together it starts to heat at once. As soon as it starts to heat the hot air goes up, and you fill in some more and that stops it and keeps it good."

Mr. Pape: "Suppose I fill the silo with green clover, wilted three or four hours?"

Mr. Sawyer: "All the better."

Mr. Pape: "When it came out of the silo would it be spoiled?"

Mr. Sawyer: "Not at all, it would be first-class; in fact a little better than if you put it in just as soon as you cut it; there is moisture enough there to heat it. This Frenchman, Mr. Goffart, thought that he had to put in green feed and dry feed to absorb that moisture, and that is what spoiled it; he got down so he didn't put hardly a particle of straw in, and then his feed kept."

Mr. Boyd: "Permit me to correct Mr. Sawyer about the straw business. I know several gentlemen who have adopted the course of putting a layer of straw over a layer of ensilage, intermitting, with the very best success. The straw absorbed the moisture from the ensilage, and it came out in better shape than it did without the straw."

The Secretary: "In reference to the storing of dry fodder and green fodder together, is it not a waste of space and expense to construct a silo for the purpose of preserving green fodder in a green condition and then occupying a portion of that space with dry fodder?"

Mr. Boyd: "You are entirely right, but I merely wanted to make the fact known that that was not an injury to the ensilage. In the case that I spoke of these gentlemen had a larger silo than they had ensilage for and they put the straw in to fill up."

The Secretary: "I think the chances are against you when you use dry straw with green fodder. The combination is liable to produce a fermentation, that is foreign to ensilage, and not only that but it increases the heat."

Mr. Sawyer: "That experiment might have been successful this last season which was a very dry one, but in a wet season I believe the chances would be ten to one against it."

Mr. Potter: "Three years ago a gentleman who is one of the largest feeders in Iowa informed me that he fed a large

number of his cattle by just running into his barn a layer of corn and then a layer of straw, and that it kept well. Mr. Gurler told me a week or two ago that he should try the experiment. He seemed to think it would work well."

The President: "Thirty years ago my father used to do that same thing. Well do I remember how he made us boys pitch the heavy green clover in, and how we mixed in the straw. He called it succotash."

Mr. Pape: "I have done just that way, and better clover I never saw and the cattle will eat the straw just as well as they eat the clover. It raised such heat that it smoked for weeks out of the holes provided for ventilation. The clover was kind of brown when we took it out—a bright brown. You can put clover in green and heat it to a great extent and it don't hurt it if there's no rain-water on it."

Mr. George: "The question with clover is to get rid of the moisture, to preserve it. You don't want to allow the fermentation to go on in clover. In ensilage you want to protect the moisture instead of letting it off; that is the preservative part in ensilage."

Now, in regard to the preservation of ensilage there are a few scientific questions that enter into it, which, when they are properly understood, are very simple. Of course everybody knows there is more or less loss in drying out corn-fodder. As exposed to the weather in the drying process it chemically changes it to an extent, and you cannot restore that chemical composition again to put it into the soluble form that you have in the green corn. In the green corn, it is in a form that gives the greatest nutriment to our stock; they assimilate it easily because it is in just the right condition; but in the drying process there comes a chemical change which has to be resolved again as far as it can be by the energies of the animal economy into its original form before it can be readily assimilated."

The President: "And that means you have got to take a part of the food to mix the other part of the food before it can be assimilated by the body."

Mr. George: "Of course, it has got to be assimilated by some other part of the food."

The secretary: "There have been some thorough experiments made upon this point, where they have tried to utilize ensilage and dry fodder at the same time. I accidentally happened to turn my hand here to a report of some experiments to prepare the dry fodder in a more digestible manner, made by Mr. Nutall, quite a prominent dairyman of England, upon the farm of Lord Vernon. These experiments were made by feeding thirty cows for five months, and he says: 'These had been fed upon hay and a very large excess of dry food, which never was applied to the proper sustenance of the system or the secretion of milk. When this experiment was commenced 5 pounds of hay and 5 pounds of oat straw per cow was cut up and put into a bin, and 2½ gallons of boiling water were thrown upon this food. The result was most satisfactory. Thus we may save the stomach of the cow a certain amount of work, and if we cannot restore the natural juices to the hay, which have been washed out or dried out, we can at least prepare it for the cow in a more digestible state.'"

While this gentleman obtained good results from mixing the feed, at the same time with the food all prepared in a green state, he would have derived still further benefit from it. The great object in the ensilage question is, of course, the preservation of succulent food for winter feeding, either for dairy cows or for beef. They both amount to the same; the stalk that will make milk in the dairy cow will increase flesh in the steer.

The President: "Will Minnesota bran make fat or meat in a steer?"

The Secretary: "Yes. Properly mixed with other stuff, it will produce both or either."

Mr. A. B. Hostetter: "I can understand why some of these gentlemen who have been in a dry country this year seem anxious to put water into their feed, but it seems to me it is a useless expense to handle water in the ensilage. Water is about as

cheap as anything we have in this country and we can supply it readily."

Another thing, these gentlemen say they mix with their ensilage a certain amount of ground feed, oil-meal or something of that kind. Now, if I have oil-meal and mill stuff I can make the cattle go through the winter in pretty good shape without the ensilage. It reminds me of an experience I had with a man who said that bran was the best feed in the world for hogs; he said he fed nothing but bran, and I asked him how he fed it. He said he just made a swill of it. "And how do you make the swill?" He said, "Well, I just mix it up with milk and they will eat all you feed." Now, it seems to me that is the way with ensilage; it depends a good deal on mixing a lot of other feed with it, and a good deal also depends on the kind of animals you feed it into. I would like to ask Mr. Boyd if the amount of cream he gets from his cows is entirely from the ensilage, or whether his cows are not entitled to a portion of the credit?

Mr. Boyd: "Of course I attribute a great part of it to the cow, and a little of it to the ensilage, but the point I want to make is this: The president wanted to know something about economy of feeding and I gave my own experience. I feed a small ration of ensilage with two quarts of bran, one quart of corn heart——"

The President: "What is that?"

Mr. Boyd: "It is the germ of the corn."

The President: "How do you get that out?"

Mr. Boyd: "I don't take that out, the hominy mill takes it out. The point I wanted to make is this, and it is a practical one, that from a moderate ration of that kind I was getting one can of cream from three cans of milk. I don't say that it is all attributable to any one of these feeds, but it is the economy of the thing. I never fed before at this season of the year for anything like that small expense. It has cost me twice to produce the same results heretofore from the same cows."

The President: "That is just the point that I am trying to

get at. We are trying to find some cheap, good food; some means by which we can produce milk cheaper than we have been producing it."

Mr. Boyd: "My cows give the same amount of cream for half the cost, and the quality of the cream does not vary."

The President: "There has been something stated in regard to what Prof. Henry has said about silo. Three years ago at our meeting at Belvidere, if you remember, he did say that so far as his experience went, the only thing gained by putting up a silo was this: That you did not have to stop for the rain, but you could put in the feed whenever you chose. I understand that after thorough experiments he backs right square down from that position, and he is just as crazy on silos as any of us."

Mr. Mourad: "I would like to ask Mr. Sawyer if any reliable comparative experiments have been made with ensilage butter as to its keeping qualities."

Mr. Sawyer: "Not that I know of. Statements have been made, but they have not been backed up by reliable experiments as far as I know."

Mr. Grossman: "If, as Mr. Sawyer has said, the shrinkage is less when the corn is comparatively green, why is it better to put in the corn in a wilted condition?"

Mr. Sawyer: "Well, it is simply a matter of weight, as I understand it, and heating quicker in the silo by being a little wilted than perfectly green. I cannot tell you why because I don't know, but it is a simple fact that it makes better ensilage to be a little wilted before going in than when going in perfectly fresh."

Mr. Grossman: "Now, another question: Mr. Boyd told us this forenoon that he fed 32 pounds of ensilage per day, other parties said they fed about 60. Mr. Boyd said his corn had ears on and that was why he didn't need so many pounds. Now, I would like to know, which is the better way to have it, with ears on or without them, that is, planting thin or thick?"

Mr. Sawyer: "That is, you might say, a local point. Mr.

Boyd says he fed his cows all they would eat, and they would easily eat about 32 pounds. I have had my cows eat 60 pounds, but not when there was ears on. If you can grow corn very cheaply in the country you live in, it will pay you better to grow a large yield for roughness and supplement it with mill-feed. If you don't grow corn cheaply, if you have to feed that in the best way, you had better plant it thinner so as to have your corn all ready there. Now, throughout the east, they can raise it cheaper by planting far enough apart so the ears will form and have considerable richness in the ear itself. Throughout the west where corn is cheap they plant it thick, and raise a large yield of it for rough fodder and put in a grain ration besides. Of course, an animal cannot eat so much of rich, concentrated food as it can of weaker food."

Mr. Boyd: "It is very possible that a cubic foot of my ensilage will weigh more than a cubic foot of yours. Yours might have had considerable more water than mine in it; might have been composed of more leaves and stalks, while mine had large-sized ears; the corn was partially glazed when I commenced to cut it, and it seems to me that that corn would weigh more per bushel than corn that was raised very thick and composed largely of leaves and light stalks."

Mr. Tenney: "The discussion here on this ensilage question has been entirely with respect to corn. How does clover do put into a silo?"

Mr. Boyd: "I have had no personal experience of it, but I cannot see the economy of it."

The Secretary: "I haven't had any practical experience in the matter, but I can tell you what Mr. E. J. Oatman said at the meeting of this association in Aurora, and he is a man who has made thorough experiments in all these ensilage questions. Mr. Oatman made the statement that he had absolute faith in clover silage; had tried a little before, and had filled one large silo with clover last year, but could, as yet, make no positive statement of results. Within a few weeks after this Mr. Oatman told me that on opening the clover silo it was found in per-

fect condition, and he said, 'The cattle, horses, and every living creature we have on the place seem to be crazy for it; they seem to relish it the most of anything we have in the way of feed. We are in for a clover silo, and we shall keep clover silage.' He appeared to consider these clover silos about the biggest they have on the place, and he is not a man given very much to enthusiasm unless the facts and figures are along to back up assertions."

The President: "A year ago last fall, when the pastures about Dundee were dry as a bone, and the owners of the creameries were very blue, I put the question to Mr. Oatman: 'Well, Oatman, how about silos now?' I thought I had got him. He said: 'There is where we have got them, we sell our hay to these fellows and we have got our silos, and we are feeding out of them.' That was the latter part of July or early in August, and he says: 'If it was not for this silo we would not be making twenty cans of milk a day from our cows.' There is where the silo business comes in. You can pack it away and store it for a time of trouble. If it cannot be said it is better than any other kind of feed, it is a very good substitute in a time of trouble. These Oatman Bros. are the owners of nine factories, I believe, and if there was anything about this ensilage that was disastrous to milk, if it didn't make good butter, you may be sure they would drop it. I have heard them repeatedly say that they could make the best milk from ensilage."

Mr. Little: "Does he cut his clover the same as the corn fodder?"

The President: "I think he throws it in whole. At the North Western Association at Beloit two years ago, there were several gentlemen who said they had had very good results from just throwing in the corn whole."

Mr. Little: "Can you keep this silage for the next summer?"

The President: "Yes, keep it for years."

Mr. Sawyer: "I fed ensilage last February and March that had been put up a year from the summer before, so it had been

kept over one summer and it had kept very good. There was a very small portion lost. The upper part of the silo had been refilled last summer, on top of the old; and I didn't know how it would work, but there was no trouble about it."

Mr. D. W. Curtis: "We have been agitating this question in Wisconsin three years. Last year we probably built about sixty silos. Last year the regents of the University engaged Mr. Austin, of Neilsville, to plant a field of ensilage corn and put it into the silo and keep an exact account of everything to know what it was going to cost. He planted twenty acres, thirteen acres of that corn he put into the silo. The corn was cut when it was a little past the roasting-ear. It was wilted from two to ten days before being hauled to the silo. It was weighed and averaged a little over nineteen tons to the acre. After giving credit for the land, keeping track of all the labor that was placed upon the field, etc., his ensilage cost him a little less than 65 cents a ton when in the silo. He thinks he would rather have two tons of that ensilage than to have a ton of timothy hay. Mr. James Smith, of Green Bay, planted a few acres which he cut up and let it dry out in the field to settle the matter of how much it went to the acre; it was hauled to the city scales and weighed. After this was dried out thoroughly it went ten tons to the acre. The sixty and eighty ton silage corn is pretty hard to find; if it goes twenty-five or thirty tons it is considered a good crop and will pay to raise. Most every one with us raises B. & W. corn. I saw in this forenoon's discussion that they thought the northern corn was quite as good as this B. & W."

The President: "No, it was the corn that was raised by the neighbors down in Georgia and Virginia, where the B. & W. corn is supposed to be shipped from."

Mr. Curtis: "This corn is grown in Georgia, and when brought to the northern country it develops a great deal of saccharine matter in the stalks, which, when it becomes acclimated, seems to depart. That is why people who have tried seem to

prefer it to other field corn. Perhaps the other field corn is good enough, but this seems to take the preference with us."

Mr. Hostetter: "A gentleman requests me to ask whether ensilage will not freeze in this latitude so as to injure the feed; and also to interfere with the convenience of feeding; also the condition that it is in in regard to mixing it with the ground feed."

The President: "Do they have any frost down your way, Mr. Sawyer?"

Mr. Sawyer: "Just a little; went down to thirty one below. I will say I have had a little trouble with ensilage freezing, but very little indeed, and whenever I have found it frozen I put it in a close box and mix it with the other feed and it comes out all right. It will freeze only on the edges and that is where a wooden silo is better than a concrete. In very cold weather, right against the wall, it will freeze; but by putting it into a box it will warm up in from twelve to twenty-four hours. In regard to mixing other feed with it, you can't get anything better. It has a moisture, and if you will throw it into a box and mix your ground feed with it as you throw it in it will mix very easily. It is damp enough so the ground feed will stick to it."

Question—"We want to know the difference in feeding value between an acre of ensilage and an acre of dry fodder after counting up the expense of raising and putting in the silo and everything."

Mr. Boyd: "Will the gentleman tell how many tons of dry fodder he has got on an acre?"

Answer—"Well, say I have ten tons of dry fodder to the acre and thirty tons of green."

Mr. Boyd: "In my opinion there is no comparison between the two at all, I would rather have the green fodder two to one."

The Secretary: "There is the same relation between these that an acre of grass has to an acre of hay."

Mr. Chester: "Testimony has been given here as to the value of ensilage in producing milk, and according to that testimony there is no question that for producing milk ensilage is a

cheaper food than dry food in the proportion of about three to one. Now I would like to know what is the value of ensilage as a meat producer."

Mr. Boyd: "I can say what a gentleman told me about the matter. The president of the First National bank of Lafayette, Ind., called on me last summer. He said that he was in the habit of feeding a thousand head of steers every winter, and that he built two silos for the purpose of experimenting. In feeding out the ensilage to the cattle he found that he had gained 50 per cent. by feeding the ensilage to the fat stock. That was his statement and he is a very close figurer; does business on a large scale; quite a rich man. He feeds 1,000 head of cattle every winter."

The secretary: "You all know the effect of feeding brewer's grains. I believe that scientific men have demonstrated the influence of brewer's grains to be somewhat similar to that of green fodder or ensilage feeding. And brewer's grains are quite fattening food. It is a fact so well recognized that it now passes as an axiom, that '*grass will make milk*' and *grass also makes beef*. You will also say that hay is grass, but grass is not hay, not by a long ways. The radical difference is produced by the drying of the plants. In ensilage you preserve the watery conditions that are not preserved in hay or other dry feed. In the green plant there exists a natural combination so subtle indeed, that it has been impossible up to the present time for scientific men to discover any process by which they can restore these watery conditions in the form in which they are first found. This applies to the subject of cattle fattening as well as the subject of producing milk, and feeding dry fodder as against ensilage is exactly similar to feeding dry hay as against green grass for the purpose of cattle fattening."

Mr. Sawyer: "I have had some experience in feeding calves with ensilage. You know it is quite expensive to winter them and keep them growing right along without any check at all. Ensilage will come in here just like turning them on grass, and as far as I have been able to observe there is no stop at all."

They grow right along because there is no big jump from grass onto dry feed; it is merely a continuation. And the same is applicable to cows. Those that are not great producers, if they eat much of it, will get fat."

Mr. C. A. Wulff: "As regards ensilage I will only tell how I have found silos in Holstein, Europe. This county, in the north part of Germany, is noted for its very fine Angeln cows whose delicate qualities make them compare with the Ayrshires. The breeders of that stock who are organized in a very solid association all over the county, and all work together, use all their clover as ensilage. The silos are generally built with brick, and in connection with the barn, from which doors lead directly into the silo, divided in two or three parts. The clover is filled in the silos from the upper floor of the barn that is aimed for keeping of straw, and into which the straw, as well as the new mowed clover, is brought on the cart by a slanting driveway. When the silos are filled the clover is covered with three rows of bricks, that follow equally all the settling of the ensilage. When the ensilage is going to be used they open one of the doors into the silo from the barn and cut the clover with an instrument like an old fashioned straight hand-root cutter. They always cut the ensilage perpendicularly and remove the bricks on the top only as much as needed. I found the ensilage during my visit there in the month of July, two years ago, a very sweet, soft and odorous food that the cows liked very much. I will say that people there generally feed their cows in the barn the whole year except one month in the high summer divided in parts of a fortnight each. As regards the ensilage question in the United States I think that is a very important one, and I believe much in trying that way to make the winter food equal with the summer food just as we in Europe try to reach that important object by raising turnips, carrots and mangles, not having the valuable corn. For feeding purpose I think corn ensilage is much to be recommended and for dairying I believe that a possible "ensilage taste" in the butter can be avoided by ripening the cream a little more than usual."

The President: "I will say for the benefit of some of you that Mr. Wulff is sent over by the government of Sweden to learn our American system of managing cows and making fine butter. He has only been here three weeks and has been in our factories to learn about making fine butter, but he has told us more than we have him.

ENSILAGE.

D. T. AND E. C. BROWN, Batavia:

The prominence of dairy interests in Kane county farming is well known to all of you, and if there be any section of our great country where a method of cattle feeding, which claims to have special value in the production of milk and butter deserves full and impartial consideration, that region is right here where we live and where most farmers are trying to make a living by dairy farming. It may be, however, that the millenium is near at hand for the cows of this country, and that they will soon be released from their stanchions and be left to wander where they will, as being no longer profitable servants to their owners, in comparison with that special pet of the Chicago stock yard lords—the Poland China grunter—for has not the great Geneva glucose factory opened up a veritable gold mine to the feeder of swine in the form of gluten slop? One of my neighbors says he can make pork for 1 cent a pound with gluten feed. And when I daily see the long procession of gluten tanks passing my house, some of them coming from beyond Aurora, and traveling over twenty miles a day to convey Mr. Pig's tippie to him, I sometimes think Mrs. Cow's day is almost over in Kane county, and that the officers of "the Prohibition party" ought to inquire into the influence and practices of the great gluten saloon up at Geneva.

I will say nothing about the morality of feeding its other product—glucose meal—to our milch cows, for we all know how it is ourselves when we are short of other mill-feed. But while we have our cows with us let us consider whether there is

any good thing we can do for them which we have not yet done, and, especially, whether there is anything we can get them to do for us which they have not yet done. In plain English let us inquire whether we can get any more money out of them by giving them a new form of food called "ensilage."

I have been requested by some of the gentlemen who were instrumental in getting up this meeting, to say something here about silos and ensilage as matters of new interest to farmers in this vicinity, especially to such as are chiefly engaged in dairy farming. The only reason why this request could have come to me is that ensilage has been used on my farm for the last three seasons, and that I may be the nearest resident to Aurora having a silo on his farm. I do not know of another nearer than Mr. Gurler, of DeKalb, and the Messrs. Oatman, of Dundee. Dr. Pratt, of Elgin, has for several years stored uncut green corn stalks in a pit excavated in the ground, but this method is now regarded as antiquated and would not be "good form" for a progressive farmer to imitate. At first a majority of the so-called scientific agricultural writers were opposed to the ensilage, while practical farmers who tried it approved and advocated it. The "book men" and chemists have mostly come round to the same view by this time.

The term "ensilage" is a general one, meaning any green forage plant for cattle which has been stored in a silo to preserve it in a green state as when freshly cut in the field. Thus it may be of corn, rye, field oats, meadow grass, sorghum, cow peas, vines, or other fodder-plant, but in the northern part of the United States it commonly signifies green corn stalks cut into short lengths, i. e. from one-half inch to two inches long. The "ensilage" is preserved in what is called a "Silo." Both terms are of French origin.

When it is first suggested to the dairy farmer that it may be expedient for him to adopt ensilage feeding, he naturally inquires whether he can get more profit out of the same acreage of land sown to fodder-corn by putting his crop into ensilage rather than into shocks and feeding it as dry fodder. This problem has

been experimentally tested by many scientific American agriculturists, and among others by Professor Henry, of the University of Wisconsin, at Madison. Professor Henry's views on the subject seem to be worthy of confidence, because he is regarded by men occupying similar positions as a competent observer and accurate reporter. His field of observation, too, being adjacent to northern Illinois, makes the conditions of the problem there very similar to those which surround us here.

Professor Henry took from the same field equal quantities of the same kind of corn plant and subjected them to the two kinds of treatment, obtaining in the one case an excellent quality of dried corn fodder, and in the other an equally good result of ensilage. Both of these were fed to the same cows, at different stages in the trial, allowing due time for passing from one stage to the other.

He found that the ensilage lasted half as long again as the fodder-corn, probably because it was all eaten clean, leaves and stalks, while a considerable proportion of the dry fodder, i. e., the butts or coarser portions of stalks were not eaten. He also found that the ensilage produced 10 per cent. more milk and 11 per cent. more butter than did the dry fodder.

Incidentally, I may here say that when ensilage was added to the dry feed on my farm at the beginning of the present season, which was on the 23d day of November last, the quantity of milk increased more than 80 pounds on the third day and so continued. The butter made during Professor Henry's experiments was all sent to a commission dealer in Chicago, who reported that in no instance could he tell which lot was from ensilage—or other food. Professor Henry's conclusion was that dairy farmers could use the silo with advantage and profit, and this is also the general conclusion of those who make a practical trial of it.

Ensilage of good quality is very eagerly eaten by most grass-eating animals, from horses to poultry. Cattle prefer it to the best quality of hay when both are placed before them. Very

rarely some animal may be indifferent to it when first offered, but soon learns to like it and eats it with avidity.

But ensilage is not in itself what scientific men call a "complete" food, i. e., one possessing *all* the requisites for nourishing all parts of the animal system. Therefore meal of some kind or other similar food should be added to make the ration "complete."

As compared with the best quality of clover hay as a food for milch cows a number of agricultural chemists rate it at one-third the value of such hay, weight for weight, but there is not always free choice open to us in the selection. Take such a season as that of last year with its terrible drouth. If you had sowed ensilage corn early, and had taken good care of it, you would have got, in all probability, half a crop at least, but what proportion of an average crop did you get from your best meadows? I know, only too well, that on my place if it had not been for twenty-three acres of ensilage a majority of the cows might as well have been given away for there was no sale for them and not feed enough for them on the remainder of 200 acres to carry them through the winter. The herd consists of 47 head, with a bunch of young stock.

One of the recommendations of ensilage is the large quantity which may be raised on an acre of land; and another very important one is the small space needed for holding the yield of many acres after it is passed through the cutter. Prof. Henry, in the official report of the Wisconsin Experiment Station, states that on good land 15 to 20 tons of green fodder can be grown on one acre. I do not know what variety of corn he used, but as this report was issued when the very large variety now grown for ensilage had not come into general use, it is not remarkable that larger yields by actual weight have since been reported. Twenty-five and thirty tons are so reported, and in the last number of the *Albany Cultivator* a New Hampshire correspondent asserts that he raised 32 weighed tons per acre. He calls himself a convert to ensilage, and says that, "from having at one time been disgusted at what he deemed the ex-

travagant claims of the advocates of ensilage he has now become one of them himself." (See *Country Gentleman*, Feb. '88.)

As to the space occupied by one ton of ensilage. This will average 44 square feet, while a ton of hay will fill 500 cubic feet. One square foot weighs 45 pounds. One bushel weighs about 30 pounds. Twenty tons can be put into a space ten feet square and nine feet high, and these twenty tons fed out as at the rate of one bushel twice a day to each animal, which is a judicious rate of feeding, will suffice for twenty cows for one month and two or three days over. A silo of capacity to supply twenty cows for six months should hold 120 tons of ensilage, and would occupy a space 28 feet long, 12 feet wide and 16 high. All the corn stalks to fill this could be raised on six acres of good, well fertilized land. The space mentioned is just about equal to one of the bays of the 30 by 40 feet barns so prevalent in our country, and such a bay would be about the very best place to put a silo, with the cow stable extending as a wing from the end of it.

I might quote statements of practical farmers and dairymen as to their great success and satisfaction in the feeding of ensilage, but the purpose of this paper is simply to invite your consideration of this subject. You will find that positive benefits may be derived from it, that you can keep more cows on your farms and obtain more milk, and that the succulent food is favorable to the health as well as nutrition of your herd; that you can make a material increase in your crops and store it in a very small compass, and especially that you can do more to insure an adequate supply of winter provender, whether the season be over dry or over wet than by any other mode of raising it on your farm. You will find, too, that no very extraordinary increase of labor is demanded of you and that only very simple arrangements are needed.

The seed corn should be of such variety as will about reach maturity at cutting time. Drill it about 3 feet 8 inches apart, dropping three kernels to the foot, so as to give a good exposure of each plant to the sun and air, and allow ears to form. It

should be properly "cultivated," left to grow until the sap in the stalk reaches the gummy state, near the time of glazing of the ears when the whole plant has its greatest feeding value. But one must endeavor to keep ahead of Jack Frost, which last calculation will suggest the forethought of early planting—as soon as practicable after putting in the field corn seed. Prof. H. found cost of filling 90 cents per ton—whole cost less than \$2.

As to the silo itself its construction has been growing simpler from the time of its introduction. It is only necessary that it be strong enough to bear the pressure of its contents without opening joints and admitting air; that it be air-tight everywhere except at the top and water-tight for keeping water out, but not for keeping it in, for if necessary to secure this last, a drain may be required.

The floor of the silo should, if possible, be level with the feeding floor of the stable, for convenience and economy in handling and feeding. There should be but one door and this is best made with separate pieces of board to slip into grooves like an ice house door-way. Silos have been built of stone, of brick, and of concrete, but wood is the best, because it is as good as any and cheapest. A stiff frame lined with a single thickness of matched flooring is all that is needed to meet all requirements. The cost should not be over \$2.50 per ton capacity. Having your silo, and the crop being ready for housing, it may be cut in the field by hand or by a short reaper; drawn near to the silo on a low, long wagon frame to the cutter. The power for cutting may be steam or horse power. Many who formerly used steam, thinking it necessary to fill their silos rapidly, now prefer to fill them slowly and therefore use a one-horse tread-power, changing the horse occasionally to the wagon. Slow filling allows the great heat generated by fermentation to pass away, giving what is called *sweet* ensilage, which is preferable to the more acid form.

The filled silo is usually covered with some material to exclude air from the surface, and many persons put considerable weight over the ensilage. Thus some use building paper,

covering this with boards, and these again with stone, or earth, or cord wood. But one of the best dairy authorities in the country tells us he uses no weight at all, preferring to lose a few inches of ensilage by mould rather than incur the trouble or cost of weighting. We have had about equal results from a covering of straw and one of paper, boards and stone.

When the time comes for feeding the ensilage we uncover the whole surface and take off successive layers. If the weather is as cold as usual with us here in winter no injury will result to the mass. The material is put into baskets of two bushels capacity, each basketfull supplying two cows with one feed. It is well to mix the mill feed that is to be used each day with the ensilage before feeding this. Two portions of this mixture morning and evening with meadow hay or good cut fodder corn given at noon will supply your cows with "table-board," as good *for them* as you could get for yourself at a first-class Chicago hotel.

SILAGE AND SUCCULENT FOOD FOR DAIRY CATTLE.

BY F. J. LLOYD.

(From British Dairy Farmer's Association.)

Before attempting to enter into the subject of this paper, it is well that we should clearly realize the ground which it is intended to cover. Succulent food is that which contains naturally a large proportion of moisture in the form of juice or sap, and silage has been specially mentioned to make it clear that this substance would be also treated as a succulent food.

As affecting all subsequent statements, one most important consideration must be borne in mind throughout this paper. A dairy cow requires in its food both quantity and quality. Of quantity, a cow in milk weighing 1,000 pounds must have 25 pounds of dry matter per diem, and this dry matter must contain, if the food is to be of the best quality, 3 pounds of albuminoids, $\frac{1}{2}$ pound of fat, and 14 pounds of starch and sugar or

carbohydrates. It is possible to give this amount of dry matter almost entirely in the form of dry food; on the other hand, it is possible to give a very large proportion of it in succulent food. The universal custom is to mix the two; and the object of this paper will be to try and point out the part which succulent food plays in the dietary of milch cows, always assuming, and it is impossible to impress it too strongly upon you, that the food contains the necessary chemical constituents.

As a scientific man, you will naturally and rightly expect me to treat the subject in a scientific spirit, and to lay before you facts which have been obtained as the results of accurate and careful experiment. Such facts, unfortunately, do not exist in sufficient number to enable one to draw definite and accurate conclusions upon all the points which will be raised. Those which do exist could not be given except in tabulated form, and such tables would be unsuitable for the occasion, as they require for their consideration the leisure and quiet of the study. My object, therefore, will be to bring before you some considerations worthy of further thought, and to elicit from the many practical and able men present a record of their experience in feeding dairy cattle upon silage and succulent food.

Experience has placed beyond dispute one fact in dairying. It is this, that the greatest yield of milk, the best butter, and the best cheese are obtained when the cattle are out at grass. But grass makes hay, and yet hay will not produce those same results. For many years it was assumed that no other change took place in converting grass into hay than drying or the passing away of water. Yet experience showed that by giving hay to cattle, and water in a bucket, one could not obtain the same results as were obtained when grass was given, and this should have taught men that there were other changes. We now know that in making hay two such changes take place other than the mere loss of moisture. The first is only a change of constituents, the other results in an actual loss of constituents. These I will endeavor to explain. Of the material of the succulent grass, the complicated digestive apparatus of the cow

can utilize three-fourths. Grass, like all vegetable matter, is built up of cells, each surrounded with a coating of material which, from its being so found, has been termed cellulose. Within these cellulose walls are contained the sugar, starch, and albumen of the plant. In a tree, as each year new cells are formed the old ones lose their contents, dry up, and become wood. The succulent cellulose of the living cells is entirely different from this woody cellulose. The former a cow can digest and utilize, the latter is no food; indeed when taken in excess, woody cellulose is detrimental to cattle. This change of digestible succulent cellulose into indigestible woody cellulose (or fibre, as it is often called) is one which takes place in the conversion of grass into hay. Moreover, it takes place in every forage and succulent crop as it approaches ripeness, and especially after it flowers; hence the necessity of cutting such crops before they are over-ripe. The second change which takes place in the conversion of grass into hay is due to fermentation and oxidation. These processes burn up the constituents of the grass, producing heat, and, if the partially-dried grass be stacked before this combustion of the cell-contents is finished, the heat may become so great as to produce flame.

Thus we are now able to explain why the dry food, hay, is so inferior to the succulent food, grass. So far as the loss of dry matter is concerned, it might be made up by the use of other dry foods; but this has not been found satisfactory in practice, and, to make up for the inferior nature of hay, it has been found essential to employ some succulent food. The use of the root crops, swedes and mangels, has thus become universal in winter dairying; but it may not be generally realized that in order to supply these crops one-fifth of the total cultivated land of England, Scotland, and one-tenth that of Ireland, other than land laid down to grass and clover, has to be devoted to their growth. Thus, in England, 2,300,000 acres are annually cropped with turnips, swedes, and mangels; in Scotland, about 500,000 acres; and in Ireland, 350,000. So that over 3,000,000 acres are devoted to the growth of crops, and at least 45,000,000 tons of

food are raised which would be totally unneeded could we but preserve in hay the characteristic properties of grass. Of this 45,000,000 tons of food no less than 40,000,000 consist of water—water which may without exaggeration be considered as mainly required to replace that which was driven away in converting grass into hay.

It is not to be wondered at that any process which claimed to preserve grass with the moisture in it, without destroying its nutritive value, should attract considerable attention, and if successful become, in an incredibly short time, an integral part of British husbandry. Such, however, was the claim of ensilage, and such it has become. The reasons of its success are to a certain extent still unknown to scientific men; but it must be owned that the use of good, well-made ensilage has proved on experience beneficial to dairy cattle, if used in moderation and with cleanliness. To what extent silage is superior to other foods, and how to make the most use of it as a food for dairy cattle, are questions still requiring accurate feeding experiments to answer. Those feeding experiments hitherto conducted have not, in my opinion, fully tested the question. Which is the better food, a ton of grass made into silage, or a ton of grass made into hay? That is the great question, and so far the evidence appears to be in favor of the silage, if the silage has been well made.

To explain what is meant by well-made silage may perhaps be of advantage.

In the early part of this paper it was stated that a fermentive and oxidising action takes place in grass from the moment it is cut, consuming nutritive portions of the grass and producing heat. The same action takes place in making silage; but as the grass is placed in the silo or stack the amount of oxygen or air which surrounds it gradually becomes less and less as the superincumbent mass presses it out from the lower portions. If this mass is not very great, so that a fair amount of oxygen is left between the grass, the heat produced by oxidation may be sufficient to raise the whole mass to a temperature above 120°

Fahr., and, as this temperature destroys those organisms which produce many kinds of fermentation, the only further change which can take place in this silage is a continuation of the oxidation until all oxygen is consumed. Further chemical change will then cease, and the resulting silage will be that which is known as "sweet silage." On the other hand, if by tramping upon the grass and by rapid filling of a silo the greater portion of the oxygen is expelled, oxidation is limited, and the silage never reaches a temperature of 120° Fahr. The organisms of fermentation are then not destroyed, and the changes which they bring about—the formation of acetic acid, butyric acid, and lactic acid—proceed slowly yet surely so long as the silage remains in the stack or silo. The result is sour silage. Side by side with these changes there are others, by which substances valuable as food in the grass are converted into substances having little or no nutritive value. Hence all silage is inferior as a food to the substance from which that silage was made had that substance been consumed while succulent. Further, there can be no doubt that the loss is greater when sour silage is made than it is when sweet silage is made. In feeding experiments on milch cows this loss is not at first seen, because sour silage tends, like grains and all substances slightly acid, to promote the secretion of milk. But the real advantage which silage possesses over hay is due to the fact that in the former the cellulose remains mainly in the digestible condition, as it exists in grass and other succulent crops, while the water natural to the grass is mostly retained.

The only conclusion which we can draw from the experience of feeding milch cows with succulent food and silage is, that the water which exists naturally in a vegetable tissue has a special effect upon the animal, and cannot be adequately replaced by water drunk in the usual way. In my opinion, it seems that in vegetable matter there is an intimate union between this water and the chemical constituents of the vegetable. What this union or chemical combination is cannot as yet be said. In mineral substances we know that water can exist in intimate

chemical union entirely different from water which is merely mixed with that substance, and we may argue by analogy that there may be a similar two-fold condition of water in vegetable substances.

Whether this be so or not, the fact remains that a vegetable as grown acts very differently as food to that vegetable firstly dried and subsequently mixed with an amount of water equal to that which had been taken away. After a careful consideration of the feeding experiments hitherto conducted, it seems to me that the succulent foods which have contained the greatest portion of water have proved the most valuable for dairy cattle, and this is apparently the chief cause why in the experiments of Mr. I. N. Edwards, and subsequently of Sir John Lawes and Dr. Gilbert, mangels have proved superior to silage. In dry matter the two diets were closely similar, but the mangels contained 80 pounds of succulent water, the silage only 40 pounds.

In order to comprehend the further development and other aspects of this subject, it is necessary to consider the organ of the secretion of milk. Unlike most other organs of secretion, it appears to allow substances taken as food to materially influence the composition and properties of its secretion. Thus coloring, tasting, and smelling substances find their way with more or less rapidity from the organs of digestion into this secretion. The water which dairy cows drink, if impure, will spread its impurity to their milk, and the quantity and quality of the food also make its influence felt upon the quantity and quality of the milk.

As 88 per cent. of milk consists of water, a good Shorthorn dairy cow will secrete in her milk 35 pounds of water per diem. There is, therefore, a great demand for water in the economy of the cow yielding milk, and remembering the influence of food on this secretion, it is easy to comprehend why succulent food should increase the flow. The well-known effects of brewers' grain must also be attributed in part to the fact that the 75 per cent. of water which they contain is somewhat simi-

lar to the water in grass and roots—is, in fact, intimately combined with the organic matter of the grains. Moreover, the more thoroughly “added water” is incorporated with the food, the easier is its secretion and the greater the yield of milk. Hence the value of preparing or cooking the food of dairy cattle.

But in this peculiarity of the milk-secreting organ, to permit this combined water of the food to pass into the milk, lies the great risk and the necessity of the utmost care in the judicious use of succulent food. There is by its use a tendency to make watery milk; to increase the flow at the risk of decreasing the quality. Whether you sell your milk, make it into butter or into cheese, be assured of this, milk of poor quality will not pay in the end. But provided due care is taken to supply the dairy cow with the chemical constituents essential to the production of good milk, it seems evident that no food is so adapted to produce it in quantity as succulent food.—From journal of the British Dairy Farmers Association.

The convention adjourned to meet at 7.30 P. M. same day.

AFTERNOON SESSION.

The convention met pursuant to adjournment at 7.30 P. M. same day.

Music—Ballet music: Rubinstein—Misses Roe and Shirk.

The President: “Our secretary is very anxious to say something that will be very pleasant to about four young ladies and I will give him a chance.”

The Secretary: “*Ladies and Gentlemen:* In making the arrangements for the dairy show of the Illinois State Dairymen's Association, it was suggested by some of our friends that the infusion of the young blood of the state into the active membership of the association would perhaps bring great advantage to us. We fell into that line of thought and made special efforts to arrange for the exhibition of the association, “The Dairy Maid's Class.” I am pleased to say to you this evening that notwithstanding the large show we have here, it is the opinion

of the judges who have passed upon the display that the quality of the goods shown is certainly a credit not only to the state of Illinois but the entire country. The scores are higher relatively and in the aggregate than the majority of the dairy exhibits that have been held in this United States. It is impossible tonight to give you a list of the entire premiums. We thought it best at this gathering of the people of this locality to give this evening the names of the four young ladies who are entitled to the prizes in the dairymaid's class. In this class, which admits only young ladies under twenty years of age, and those who have entered are all under seventeen, the first prize, which is a solid gold ladies watch, is won by Miss Mettie Bailey, of Mount Carroll, with a score of 86. The second, a regular dairy outfit, offered by our friends, Cornish, Curtis & Green, of Wisconsin, is won by Miss Emma Poorman, with a score of 84. The third prize, a churn, offered by the Union churn company, is won by Miss Clara Gordon, with a score of 80. The fourth prize, a copy of Willard's Dairy Husbandry, offered by the *Dairy World*, is won by Miss Edna B. Melendy, of Thompson, with a score of 76½.

HOLSTEIN CATTLE.

HON. E. A. POWELL:

Gentlemen of the Illinois State Dairymen's Association: It is with deep regret that I deny myself the pleasure and the profit of attending this this (the 14th) anniversary of your association. I have never attended such an assemblage of practical men without gaining much useful information.

The question of the selection of breeds for the dairy is of paramount importance, the decision of which frequently decides the future success or failure of the enterprise. This difference in breeds often marks the dividing line between profit and loss, and hence this question is worthy of, and should receive, your most earnest, candid and unprejudiced consideration.

By the request of your esteemed secretary I have reluctantly

decided to present for your consideration a few facts about the Holstein-Fresian breed, but in doing so I will endeavor to treat fairly and justly all those other valuable dairy breeds which have contributed so largely to the success, wealth and importance of the dairy business in America.

The Jerseys, Guernseys and Ayrshires, are all valuable for the dairy, and not without reason; the Shorthorns and Devons have their friends among dairymen. Any one of these breeds is a vast improvement over the native, but the important question now is, when only superior cows will pay a profit, which breed will show the best balance at the end of the year and under the greatest variety of conditions and circumstances?

The Holstein-Fresians, as all the members of your association are doubtless aware, have been imported to this country from Holland, where, under the most favorable conditions for the development of all the qualities which are essential in good dairy cows, they have been improved and developed for many centuries.

Holland is pre-eminently the dairy country of the world, producing annually a much larger yield of dairy products, of greater value, in proportion to her area, than any other. Both cheese and butter dairying are extensively carried on there and hence quantity and quality of milk are both essential and the breeders there have aimed to accomplish such a union—with what result some of the statements which follow will show.

Beef and veal are also important factors in the cattle industry of that country, a large and fine cow being worth almost as much for beef as for milk, and hence the development of the beef qualities have not been overlooked by these shrewd, close-calculating and far-sighted people.

Holland probably has the finest pastures of any country known, which tend to encourage rapid growth, early maturity, early breeding and an unusual development of all the milk organs. These characteristics, produced from whatever cause, when continued for many generations, become so fixed, so

allied to nature, as to be transmitted from ancestor to offspring from generation to generation.

Land in that country is extremely high, rents are enormous, and hence dairymen can afford to keep none but the very best class of cows. As soon as a cow has proven by trial that she is not superior she is sent to the shambles, the carcass of an ordinary cow being of more value for beef than the cow would be in the dairy. Her offspring are also disposed of in the same manner, for these observing and shrewd breeders long since learned that they must not look for superior cows from inferior ancestors.

This peculiar combination of circumstances, necessities and surroundings, has forced upon that country a rigid, practical system of selection, which is almost universal. This system, although slow in its results in comparison with scientific breeding, has been in vogue so many centuries that the inferior elements of the breed have become almost extinct. There is, of course, the same difference between individuals and families there as here, but the standard is much higher. Thus briefly have we surveyed the conditions which have contributed to the production of the majestic black and white cattle which have inspired so much enthusiasm on the part of those who have been breeding them in this country.

I think it safe to say that no other breed of cattle has ever grown so rapidly and universally into favor in so short a time in America.

The sources of profit from dairy breeds are: First, milk; second, butter and skim-milk for feeding; third, cheese; fourth, offspring; fifth, the carcass for beef. In point of value these products come about in the order named. In estimating the value of a dairy breed its ability to yield profitable returns from each and all the sources should be considered. The breed that will leave the largest balance from all sources on the credit side, after deducting keeping and care, is the most profitable and hence the most desirable.

Let us see how the Holstein-Fresian breed is adapted to each of these purposes.

First in importance is the production of milk, for without a large yield, of good standard quality, not only the milk-man but also the cheese-maker, must do business without a profit. For this purpose I think an unchallenged supremacy will be conceded to this breed. Of all the cows, of all the breeds, that have made well established records of over seventeen thousand pounds in a year, of which there are probably fifty or more, the entire number, unless some records have escaped my notice, are Holstein-Fresians. If I am in the error some kind friend will please correct me, giving name and date, and stating where the record can be found. Ten cows of this breed are credited with records of over 20,000 pounds; three with over 23,000 pounds, and one with over 26,000 pounds, in a year.

It may be of interest to note that of the ten cows which have records exceeding 20,000 pounds two are of the Clothilde family, two of the Aggie family, two of the Rip Van Winkle family, the other four representing as many families. The entire number of mature cows in the largest herd of this breed in the country averaged for one year 17,166 pounds 1 ounce, and the same year in the same herd, the entire number of 2-year-old heifers—34 head—averaged 12,465 pounds 7 ounces. When it is understood that the dairy cows of this country average only about 4,000 pounds per year, the value of a breed which can make such records can hardly be overestimated. The standard which has been established by the Holstein-Fresian Association, in order to entitle cows to admission to the Advanced Registry, shows the confidence the breeders themselves have in their favorite breed, for no one would advocate a standard that he did not feel confident his own cows would reach. These are the minimum records on which cows can be admitted: (I will only quote the yearly records required, for short tests are of little value as an evidence of actual worth).

The requirements are that a cow must score 80 points out of a possible 100, and must also (if a mature cow) have made a

record of 10,700 pounds in ten consecutive months; this is fully equal to 12,000 pounds for the whole year.

Perfect confidence, after thorough trial, alone would have induced shrewd breeders to establish such a standard for their own cows. What other association of breeders would voluntarily establish such a standard?

I have heard the statement made by parties who do not know the facts that these cows would exhaust themselves and after making one large record would be worthless.

Nothing could be farther from the facts. Aegis, at 6 years of age, gave 16,823 pounds 10 ounces in a year—the first cow to make such a record. She continued to give 13,000 to 15,000 pounds for six years in succession and at 11 years of age gave 90¾ pounds in a day, 16,645 pounds 13 ounces in a year; at 13 years of age, made 25 pounds 13 ounces of butter in a week and now, at 14 years old, is apparently as good as ever.

Aggie Rosa gave, the first year after importation, 16,156 pounds 1 ounce, and the following year, without going dry, gave 20,225 pounds 3 ounces, and now, at almost 11 years of age, is capable of repeating the performance.

Lady Fay, after making a record of 20,412 pounds, the following season gave over 6,000 pounds in three months, on grass alone, excepting a little grain for part of the first month, before grass became good.

Echo gave, at 9 years of age, 18,120½ pounds, and the following year gave 23,775½ pounds.

Clothilde, when 3 years old, gave 15,622 pounds 2 ounces, the largest record for that age and date; as a 4-year-old she gave 17,970 pounds 3 ounces, the largest record for that age and date; as a 6-year-old she gave 26,021 pounds 2 ounces, surpassing all records by 2,245 pounds, and this, the following year, she has given 101 pound 2 ounces in a day, 2,765 pounds 4 ounces in a month, and 12,842 pounds 3 ounces in 6 months and 3 days, although kept much of the time on grass only, with no grain, and for two weeks of the time when in full flow she was kept on dry hay and water in order to reduce the flow of milk,

showing conclusively that she could easily have exceeded her last unparalleled record.

HOLSTEIN-FRESIAN AS BUTTER COWS.

No other breed has ever advanced so rapidly to a foremost position in this particular line of production.

When first introduced into this country, on account of their large yield, these cows naturally went into the hands of milk producers, and it is only within the last six years that they have attracted the attention of dairymen as a valuable butter breed. Its growth in that short period has been like magic. It has already attained a high position among the great butter breeds. Long has the beautiful fawn of the Jersey isle borne the sceptre of queen of the churn, but this stately Dutch maiden has already shaken her throne and has won victories against great odds, in point of numbers, and against public prejudice, which shows that the crown is no longer worn with a sense of security.

When Mercedes won the *Breeder's Gazette* challenge cup from Mary Anne, of St. Lamberts, it was claimed by the friends of the latter, and generally believed by the public that this great cow was an accident; that she could not be duplicated in the breed. When Tritonia won the prize in the "oil test" at Minneapolis it was because the little fairy "was nervous."

After the most noted and wealthy Jersey breeders and admirers of the New England and middle states had planned and organized the great Madison Square Dairy Show, offering larger prizes than had ever been awarded at any dairy show in America, securing the presence of the best representatives from nearly all the most noted Jersey and Guernsey herds in those states, making, as a leading Jersey breeder stated at the time, "the most remarkable collection of dairy cows ever seen in any show on earth," and when Clothilde had won the great butter prize, surpassing all competitors, excepting her 3-year-old daughter, by over 29 per cent., a large majority of those in the test being Jerseys, not until then—in fact, not until some time

after the show was closed—was the discovery made that “*the Jersey breeders had been caught napping.*” “All their best cows had been left at home”—a calamity not discovered until Clothilde had won the beautiful silver cup offered by the president of the American Jersey Cattle Club, on which had been engraved a beautiful Jersey heifer, in anticipation of a Jersey victory, and Clothilde fourth, a 3-year-old heifer, had beaten the best Jersey and Guernsey cow by 6 per cent., and Mechtilde had made within $\frac{1}{2}$ ounce of the same amount as the best of any other breed—and it was not until butter tests for large prizes, large additional prizes being offered by the A. J. C. C., had been arranged for several of the state fairs, a majority of which, when they were contested for, being won by the black-and-white cows, that it was discovered that such public tests were not satisfactory. “Afterthought is better than forethought,” and hence it has just occurred to a prominent association of Jersey breeders, “that tests made at fairs or other public shows do not furnish any true indications of the capacity of a dairy cow.”

We will hastily refer to a few other records which have been verified by the superintendent of advanced registry and proven by sworn statements, which would establish their accuracy before any court of justice in this country:

Aggie 2d made 304 pounds $5\frac{1}{2}$ ounces of butter in ninety days.

Albino 2d, when 3 years old, made 106 pounds 14 ounces in thirty days.

Netherland Princess 4th, at 28 months old, made 21 pounds $10\frac{3}{4}$ ounces in a week, and 80 pounds 6 ounces in thirty days.

Not one of these records, if I am rightly informed has been equalled by a cow of the same age for the same length of time.

Comparison of larger numbers will give a more accurate idea of a breed and hence we will quote from records of whole herds:

The Yeomans herd, with only about forty cows in milk, report nine 2-year-olds which average 12 pounds $13\frac{1}{3}$ ounces in a week; four 3-year-olds averaging 17 pounds $9\frac{1}{4}$ ounces in

a week; fifteen 4-year-olds averaging 20 pounds 12 8-10 ounces in a week; twelve best cows average 21 pounds 6 $\frac{3}{4}$ ounces in a week; five best cows average 23 pounds 7 ounces in a week.

In the Lakeside herd one hundred cows and heifers have been tested, whose records average 17 pounds 42-100 ounces of butter per week; sixty that averaged 20 pounds $\frac{1}{2}$ ounce per week; twenty-two cows and heifers averaged 23 pounds 1 19-22 ounces in a week; fifteen averaged 24 pounds 11-15 ounces a week; twenty-three 3-year-olds average 17 pounds 9-23 ounces a week; eight 3-year-olds average 20 pounds 2 ounces a week; ten 2-year-olds average 14 pounds 3 3-10" ounces; thirty-eight 2-year-olds average 12 pounds 16-38 ounces.

The week before last six cows were tested at Lakeside with the following result, which are in addition to those given above: Aggie May, 20 pounds 2 ounces, in a week; Aggie Idaline 2d, 20 pounds 5 ounces in a week; Aggie Hannah, 19 pounds 7 $\frac{3}{4}$ ounces, Aggie Idaline, 19 pounds 2 $\frac{3}{4}$ ounces; Margaretha, 19 pounds $\frac{1}{2}$ ounce; Aggie Eva, 17 pounds $\frac{3}{4}$ ounce. This includes the entire number in test at that time.

For the express purpose of giving you the following facts, I have just visited the main barn at Lakeside, in which a majority of the mature cows in that herd are kept:

I found, in all, fifty-four cows, all of which had been tested for butter; three had made their records as 2-year-olds, thirteen as 3-year-olds; seven as 4-year-olds and thirty-one as mature cows. The smallest record was 13 pounds 5 $\frac{1}{2}$ ounces per week, by a 2-year-old heifer; the largest was 28 pounds 2 $\frac{1}{4}$ ounces per week, made by Clothilde. The average for the entire fifty-four head was over 18 pounds 13 ounces per week: twenty of these cows had records of 20 pounds in a week or over.

This was at one barn only and does not include a large number of 20-pound cows on other farms.

A comparison of the above records, with those of herds of other breeds, may be of interest to those who wish to solve the question, "Which is the best butter breed?"

It has been very gratifying to those who are especially inter-

ested in the subject to observe how readily this breed responds when bred with intelligence and care and to proper feeding for the production of butter.

Certain families have proven to be very superior for butter and by judicious crossing and commingling of such blood the most satisfactory results have been attained. The Netherland family is a marked illustration, in which thirteen cows have made butter records which average 19 pounds 4 ounces per week, and the entire number average a pound of butter from 18.82 pounds of milk. Out of eight daughters of Netherland Prince, at Lakeside, which have been tested for butter, six heifers—four 2-year-olds and two 3-year olds—have made records which average 16 pounds 12 5-6 ounces per week—16.91 pounds of milk making a pound of butter. Four of these heifers, two 2-year-old and two 3-year-olds, average 20 pounds 1 ounce per week. But a few years ago it was a rarity to find a cow of this breed that would make a pound of butter from 20 pounds of milk, but such has been the progress made that now a pound of butter from 15 to 17 pounds of milk is not unusual and in a few instances 13 to 14 pounds have been found sufficient. It is worthy of note that the lowest butter record which will admit a mature cow to the advanced registry is 15 pounds per week. The standard of excellence for no other breed has been set so high.

In this connection should be considered the value of the "skim milk" for feeding purposes, which is no small item.

A cow should have credit for her entire earnings, whether derived directly from her butter or from the milk after the butter has been taken from it.

Under the present system of separating the cream from the new milk, leaving the latter to be fed sweet, it is an item of no small value for feeding calves, pigs and other stock.

The milk of Holstein-Fresian cows is very superior for feeding purposes. Calves will grow rapidly and fatten readily for veal when fed on this separated milk only. The late Colonel Hoffam, whose statements will be unquestioned by those who

know him, asserts that his calves have repeatedly made a growth of 100 pounds per month on "skim milk," with no other feed. A good cow of this breed will not only raise her own calf, but will also fatten several veals during the year, after the cream has been separated. I am confident that the separated milk from a No. 1 dairy of this breed, properly utilized, will pay for the grain feed which is necessary to keep the herd in good dairy condition. Therefore, if two breeds will make an equal amount of butter, the one from an average milk yield of 12,000 pounds per cow and the other from 6,000 pounds per cow, the former is decidedly the most profitable butter breed. This subject is worthy of your careful consideration.

Every dairyman should bear in mind that, although he designs making butter now, he may in the near future find it more profitable to sell milk or make cheese. These facts should be borne in mind when making a choice of breeds. The supremacy of its breed for the purpose of making cheese will, I presume, not be seriously questioned and I will not tax your patience in discussing this point. The quantity of milk given by cows of this breed and its very superior quality for cheese will settle this question.

The value of the offspring should be considered by every breeder. Every dairyman must expect half of his calves to be males and unless they are "full bloods" their only value is for the shambles. For veal the Holstein-Fresians have no equals. They are of a larger size at the usual age for vealing than any other and we doubt if there is any breed that will show a better return if kept upon the farm until they can be put upon the market for beef at two years old. They make a very rapid growth while young and attain to a large size at an early age. In verification of this statement I would call your attention to the report of recent experiments made at the Michigan State Agricultural College, where, in comparison with several other breeds, including Shorthorns, Galloways, Herefords, Devons and Jerseys, the Holstein-Fresian steers made a larger gain in proportion to the feed consumed than any other breed.

It is to be regretted that the proposition of the Missouri State Agricultural College to make comparative tests on a large scale with all the beef breeds should come to naught through the failure of all but one association to furnish the ten calves required for the experiments.

Prof. Sanborn's generous offer to take ten steer calves of each of the breeds which are desirable for beef, give them the same feed, care, &c., and report the result to the public each year, would have afforded much valuable information. Said calves were to be selected and furnished by the various associations which represent the various breeds and to be ready for delivery September 1, last. The Holstein-Friesian Association, through a competent committee, selected ten thoroughbred bulls of the best breeding, which were donated by ten breeders, had them steered and in readiness for delivery, when they were surprised by the notification by Prof. Sanborn that the enterprise must fail, as no other association had responded. It is a public misfortune that the country could not have had the benefit of the information which such an experiment, under such intelligent and reliable supervision, would have furnished.

The ultimate end of all the bovine race is the shambles, and, although I would not breed or keep an inferior or even ordinary cow for the sake of having a good carcass when her career is finished in the dairy, yet this is a matter that should not be overlooked, and, other qualities being equal, any dairyman of intelligence would select cows which can be converted profitably into beef.

All the above qualities are essential in the dairy cow and the breed which successfully combines them all is the profitable one for the farmer and dairyman. Very respectfully,

EDWARD A. POWELL.

Syracuse, N. Y., Dec. 10, 1887.

Vocal solo, "Spring Time"—Becker; Miss Floy Topping.

THE AYRSHIRE COW.

HON. JOHN STEWART, Elburn, Ill.:

Ladies and Gentlemen: I am sorry to say that I will not be able to interest you perhaps as much as you may expect. I am not an orator or a public speaker, notwithstanding I have had the misfortune to be in the legislature a couple of terms.

I will simply say in regard to the Ayrshire cow that I have had a little experience in that line, and can tell you a very little about that.

The Ayrshire cow, as many of you know, has been produced in Scotland by three or four hundred years of breeding, principally in the low lands of Scotland. By long lines of breeding they have produced a breed of cattle which they call Ayrshires, and which they claim was produced simply by feeding and milking in a country where they wanted milk more than anything else. The Ayrshire cow is not as large as the Holstein. In their own country, as I saw them about three years ago, they will run about twelve hundred weight when fit to kill. They do not raise them as much for beef as they do for milk. They are red and white, of rather a fine make, not coarse made, being rather of a nervous temperament, but docile when well cared for.

It is true that in this country we have never had many Ayrshire cows. There was quite a number imported about sixty years ago into some of the eastern states, and a few have straggled out into this country and you will find once in a while a man who says he has some Ayrshire cows, but I never found a herd of Ayrshire cows in the state of Illinois except one that I have. I have about one hundred head of pure Ayrshire cows that I have imported within the last fifteen years and bred from those that I imported. They are good milkers, hardy, and I like them very well and they suit me. I have none for sale and consequently I have made no advertisements, and I have kept no particular record that I could give in regard to the Ayrshire

cow. There is a large amount of Ayrshire records that I might probably have gotten from the east, but I don't know of any being kept in the western country.

Our method in this country of raising cows and selecting them is very different from theirs in Scotland. Here we have but few and try to keep every one we raise, consequently we never do get a perfect herd. I visited herds of cows in Scotland where they had from forty to one hundred cows in one field, all pure Ayrshire, and after spending several hours in looking over them I have failed to find one imperfect cow. There they very carefully select a few of the best and keep only those, consequently there is a constant improvement. The trouble in this country is that they keep them all and don't improve the breed, and without selection they will be more likely to run down than up, and of course that gives them in Scotland a large advantage in producing good cows where they have but the one kind to breed from and keep only the best.

I don't know how much my herd of Ayrshires produce; I ship my milk to Chicago. To-day I am milking about one hundred cows and have never kept a record for any month consecutively for the whole herd. I recollect making one test which showed that sixty cows averaged from sixty-two to sixty-four pounds a day for about six weeks, and they had no feed except what they took out of the field. That is as good as I ever knew any of my Ayrshire cows to give that I kept a record of.

I won't say that all Ayrshire cows are good, but I have never seen a very poor one. They are something like the Irishman said about the whiskey, he said there was no bad whiskey, but some was better than others, and I will say there are no bad Ayrshires, but some are better than others and some worse than others. As to these tests that have been made that we hear about, my experience of such tests is that the result is very vague and uncertain. I could relate to you one instance under my own knowledge where a man made a test of a cow and stated that the cow was doing such and such things, the test being made in the winter, when in fact, the man that fed

that cow told me she was kept in a barn with steam heat and drank twice as much milk every day as she gave, and was kept in the best manner in every way. Those kinds of tests I don't go much on.

Of course, I do not wish to disparage any other breed of cattle. There are good milkers among other breeds. I am not willing to concede that the Holstein cow will produce more milk and butter than any other cow for the amount of feed she will consume, and I am ready to put two Ayrshire cows with two Holsteins and with the same feed, and agree whoever gets the best record shall keep the cows.

I do not believe that you can raise a cow for all purposes; I think the cow that makes the most beef will not make a good dairy cow. You know that amongst the Durham cattle we get some fine milkers and some fine cattle, but as far as my experience goes, those that make good milkers, do not make good beef.

There have been a good many objections thrown out by a great many people that the Ayrshire cows are rather inclined to be nervous and rather inclined to have short teats, and it is true that there are some that way, but it is a matter that can be easily obviated. The Scotch people are very much prejudiced against what they call a long and hanging udder, that is, low down, and they breed their cattle as much as possible to have their udders spread out well under them, consequently they usually get an animal with short teats. I asked them about that and they said that the girls did all the milking and it is much better than men; and that reminds me I would like to see the ladies of this country import two habits from Scotland: one is, the ladies do all the milking, and they do it better than men; and the other is, the habit that they have in that country that the farmer's wife always carries the purse, so she never has to go to her husband when she wants to buy a new bonnet, and the men say it is a good thing, because sometime in this country our wives ask us for money and we deny it to them; we say we haven't got it, and they don't always believe us.

I think it takes good milkers to make good cows, and I have been troubled a good deal in getting good milkers.

Now, about these Ayrshire cattle: These herds of cattle we hear so much about, that have made so much money to their owners, I notice their owners always have such cattle to sell; they have paid hundreds of thousands of dollars out all over the country to make these tests, and get big records, and get money out of them, and consequently you hear a great deal about these large cows and very little about Ayrshire cows, because nobody has brought any here to sell and that is one reason why very few people are posted on Ayrshire cattle.

Now, in regard to the feeding: I know a Holstein cow is a good milker; I also know that she will consume more food than an Ayrshire, but the Ayrshire is machine made up with a capacity very strongly developed to turn her feed into milk, and I have cows to-day that I can't give them feed enough to make them look well; the feed will not go to fat but to milk.

There is another quality that the Ayrshire cows have got, they will milk a long length of time, in fact I am sorry to say that I have got some cows that my men say they could not dry up at all before they come in again. They are not a class of cattle that will give a big flow of milk for one or two months and then fail, at least that is not my experience with them. I believe I have told you nearly all there is about an Ayrshire cow that would be likely to interest you.

Song, "Oh, Are Ye Sleeping, Maggie"—J. G. Lumbard.

THE JERSEY COW.

The Secretary: "It has been agreed as a preamble to the introduction of the Jersey cow subject that a few paragraphs of an able paper from Mr. Dean be read. I am sorry Mr. Dean, who is so well qualified to do ample justice to this worthy subject, is not here in person to tell you the merits of the Little Queen of the churn. That has been her name for years. While the contest has been active and there have been very strenuous efforts to

take the scepter from her, her friends maintain that she still holds it."

DAIRY CATTLE.

(Excerpts from Hon. J. Q. A. Dean's paper before National Stock Association.)

The average milch cow of the United States does not yet average 400 gallons of milk per year, and in the special milk making regions the average does not exceed 500 gallons. Yet there are numerous single herds of ordinary breeding, but well selected, where the annual yield is from 800 to 900 gallons per cow, and others of pure dairy-bred animals where the average ranges from 1,000 to 1,200 gallons per cow.

It will readily be seen that the improvement of the dairy cow is of vast importance to cattle growers of America, as the addition to the milk production of but a few gallons to each cow means a large amount added to the aggregate receipts of the dairy. The time was when almost every cow that would give a reasonable supply of milk was satisfactory, but with the introduction of the creamery and the better methods for manipulating her products, the improvement of the dairy cow becomes an imperative necessity.

The improvement of the cow by expert breeding, by which her capacity for profitable production has been so largely increased that when formerly an average of 2,000 pounds of milk and 125 pounds of butter would do we are not now content with 6,000 pounds of milk and 300 pounds of butter per year.

The dairy cow is now bid for specialty of product. The general purpose cow is for the time lost sight of, and special breeding for milk production and butter production is the order. The Ayrshire cow and the Holstein-Friesian for quality of milk, and the Guernsey and Jersey cow for butter.

The Jersey shows what can be accomplished for the improvement of the butter cow. While the quantity of milk given by the Jersey is not as large as that given by the black and

white cow of Holland, still in some cases when bred for large quantities of milk, as shown in the descendants of the old Daning herd, we find that Matilda IV. produced 26,153 pounds and 12 ounces of milk in one year. That this milk was of good quality is shown by the fact that in the month of January, the tenth month after calving, she made 73 pounds and $\frac{1}{2}$ ounce of butter. Twelve cows in the same herd averaged nearly 9,000 pounds of milk per year each.

The butter value of a cow is not shown by ability to make an exceptionally large quantity for a day or a week, but the yearly test is the only real measure of her value. In Jerseys we have Jersey Belle, of Scituate with a yield of 705 pounds in a year, Eurotas with 778 pounds and 1 ounce, Mary Anne, of St. Lambert, 877 pounds, and Landseer's Fancy with 936 pounds 14 $\frac{3}{4}$ ounces in twelve months, nearly, if not quite, her own weight in butter in one year.

The objection is often raised against the Jersey that they are too small to suit farmers generally. While it is true that there are many small Jerseys it is also true that there are many of good size. It is by no means unusual for Jersey cows to weigh over 1,000 pounds, when in working order. Hon. Edward Burnett states that the average weight of the entire milking herd at Deerfoot is about 1,050 pounds. In other cases when breeders have given attention to size, the average weight of herds is as great.

The value of the use of good butter-bred bulls to improve the product of a herd is shown by Mr. W. R. Mowry in the *Country Gentleman* of October 13, 1887. In 1885 his herd consisted of native cows and averaged 125 pounds of butter a year per cow; in 1880 they were all grade Jerseys 2 and 4 years old and averaged 187 pounds per cow; in 1886 they were one-half thoroughbred Jerseys and they averaged 276 pounds of butter each per year.

The physical characteristic of the milk of the Jersey cow shows that she is especially adapted to the butter dairy. The conclusion we draw from the above is that the Jersey cow can be

made profitable as the milkman's cow when properly bred and cared for, and for the home dairy she has no equal. The general high average production of butter by the Jersey is one of her proven characteristics, and is not confined to any one strain or family, which naturally follows from the fact of her having been bred for a long series of years for special dairy work.

When the early breeder of the beef animal ascertained what he wanted, and the form and characteristics most desirable, by faithful work and close, careful breeding, he succeeded in establishing the requisite good qualities. So in the breeding of dairy cattle, by careful selection and applying the churn test and breeding only from the best milk and butter producers, will he be able to make the improvement so much desired.

The comparatively recent application of a system of testing dairy cows and more careful recording of results must be of incalculable value to the dairy breeds and should receive the approval and encouraging aid of every association of breeders of dairy cattle and all interested in their improvement. The association of breeders of dairy animals of this country is to-day strong and flourishing and every effort made by it in the way of encouraging and promoting both private and official testing is a move in the right direction. These tests should have all the safeguards thrown around them, for their proper verification, that can safely be adopted and rules and regulations for the conduct of tests carefully prepared, which should include in the report of the test all kinds and quantities of food consumed.

The good done and the increased interest in the careful handling of the dairy cow and her products, will more than compensate for the outlay of time and money. One of the great requirements in the handling of dairy cattle to-day, is proof of actual performance at the pail and churn.

Vocal solo, "My Mandolin"—Miss Laura Preston.

THE JERSEY COW.

JOHN BOYD, Elmhurst, Ill.:

Mr. President, Ladies and Gentlemen: I am placed in a very awkward position to-night. In the first place, I am no speaker, and in the second place, I did not expect to say anything on the subject of Jerseys. There are other gentlemen, set down for that subject, and I am merely put on as a make-shift.

You all know that the Jersey cow is a small cow. She probably appears very much smaller to you to-night since you have heard these immense milk records of the white and black cow, but notwithstanding she is a small cow, she is also a butter cow, and if I were to follow the lead of Mr. Powell and attempt to read to you to-night the records of the Jersey cow for butter I would keep you here all night and all day to-morrow. We have volumes of them, here is one. I do not intend to read them to-night. This is only one volume and every record contained in these volumes exhibits fourteen pounds of butter or over in seven days.

Prejudice is a hard thing to fight against. Prejudiced judgment beforehand, condemned without a trial. This is about the position the Jersey cow occupied with the western farmer a few years ago. I have a distinct recollection of attending agricultural fairs in this state and neighboring states a short time ago, a few years ago, when the prejudice of the farmer ran mountains high against the little Jersey cow, but I am happy to say I have lived to see the time when those prejudices are melting away like the snow before the sun, in every family and in every home where the little Jersey has been introduced. Notwithstanding all this opposition to the Jersey cow, they have increased so rapidly in number, that to-day there are in the United States, between forty and fifty thousand registered Jersey cows, Heaven knows how many Jersey grades. I have no prejudices myself against the Holstein breed of cattle, Shorthorn breed of cattle,

the Ayrshire, the Devons or native cattle. I believe I would go as far as any man to see a good herd of working cattle, let them be of whatever breed they may, but I confess I love the little Jersey best.

The question for the farmer to answer and put to himself is this: How much animal product can he produce from a given quantity of food? This is a practical question and one that must be answered by the farmers for themselves. Scientific experimenters tell us that a cow requires 3 pounds of dry food for every 100 pounds of her live weight, and I believe that it is pretty generally acknowledged to be a correct estimate by breeders generally.

Now, a Jersey cow will weigh from 700 to 800 pounds. We will call it 800 pounds. According to that rule, she would require 24 pounds of dry feed per day, whereas the large cow, the short-horn cow, or the Holstein cow, weighing 1,200 pounds, would require 36 pounds of dry feed per day, leaving a balance against the large animal of 12 pounds per day. This multiplied by 365 days, the number of days in the year, would amount to 4,380 pounds dry feed. Estimate that at $\frac{3}{4}$ cents a pound and it would amount to \$32.85. The usefulness of a cow extends to at least eight years; I think that a cow is not past her prime until she is about 8 years old. Calculating on that basis, eight years, at \$32.85 a year, we would have a difference of \$262.85 for feed alone.

Now, take it for granted that your large cow produces just as much butter as my little cow and you still have a balance against you in eight years of \$262.85 for feed. But history does not show that the big cow produces the most butter by any means. The Jersey records for butter have never been equaled by any other class of cows; but take it for granted, for the sake of the argument, that a large cow produces just as much as the little one, they still have a balance against them in the eight years of \$262.85.

I have no faith in breeding phenomenal cows any more than I have in breeding phenomenal trotting horses. What the

average farmer wants is a good cow that will produce from three to five hundred pounds of butter a year, and this he can have by breeding Jersey cattle and their grades. We might pile up documents as high as this building to show what Jerseys and their grades have produced in this country right amongst you, and what they have done they can do again.

Speaking of the quantity of milk that a cow gives we do not claim that the Jersey cow is a very large milker, but I have 2-year-old heifers of my own breeding that will give their own weight in milk in twenty-one days. I consider that a pretty good yield. Also some young cows that have produced over 14 pounds of butter in seven days. Several have done that at 2 years old, (at 24 months old.) That is when they come in profit, they come in profit with us at about two years.

I have a friend who is a first-class dairyman if there are any in the country, but he has always managed his dairy this way: He never raises calves, but always goes out and picks out his cows, and he knows how to pick out good ones. He carried on his dairy in that way producing a very large sum of money from the number of cows he milked every year, a very successful dairyman, usually milking from thirty to fifty cows. I was quite familiar with him, and I kept poking at him all the time to get some Jersey cows. I knew that if a practical man like him had some Jersey cows he would make a mark in the dairy one that a great many of you would have to mount pretty high to approach. I kept poking at him for a long time about Jerseys. One day he came to my house and there were some other gentlemen there taking away some cattle I had sold them, and he said to me, "about what will you take for that heifer?" I said so much. Well, he said, "send her home." She was about eight months old at this time, that was about a year and a half ago. A short time ago he came in to see me, and he says, "Boyd, that little heifer that you sold me has had a calf." "Well," I said, "it is pretty early isn't it?" "Yes, twenty-one months old." Said he, "she is the best cow I have in my barn." I looked at him in surprise, because I thought he was trying to

give me taffy or something of that kind. He said, "I am not joking. She is giving me thirty pounds of milk a day." I considered that a compliment, because the gentleman was handling good cattle, extra good cattle, in fact I have been to his place when his thirty odd cows, three months in milk, were producing a pound and a half of butter a day average for the whole herd.

I wish I had been prepared on this subject and I would have given you all you wanted of it. I would not like to quote all the records of the Jersey cows, that would be impossible, but I want to say this: I live in the northern part of the state, just about as far north as you do; in the southern part of Wisconsin and in the northern part of this state, east of here, there are a great many grade Jersey cows, a great many. These are scattered in amongst the dairies; and I have a very large sprinkling of acquaintance amongst western dairymen, and I fail to find the first instance where a farmer has tried a Jersey cow and gone back on her.

I think I have told you nearly all I know about the Jersey.

THE KERRY COW.

(ANSWER TO A QUESTION.)

These small, hardy and pretty animals are bred almost exclusively by small farmers, living in the mountains and wild glens of certain districts in Kerry, Ireland, and have to be purchased with care, mostly in ones or twos. Pure Kerrys are limited in number, but they are now being bred with more care, as the farmer finds that they fetch so much more than ordinary stock. The most approved color is black, sometimes with a little white, especially about the udder. One good point about the Kerry is its comparative freedom from the fatal disease known as the dropping after calving. With a very extensive experience of the breed, Mr. Barker, of St. Ann's Hill, does not remember a single case, although he has suffered serious loss in this way with Jerseys and other varieties. While on the

subject of Kerrys it may be observed that the late Dr. Voelcker, in one of his lectures, declared that one of the richest samples of milk he ever analyzed was that of a Kerry cow, and Professor Sheldon thus refers to the breed: "Last, I come to the gentle Kerry, the only breed which Ireland claims as peculiarly her own. The Cottier's cow *par excellence* the Kerry is, subsisting on the poorest land—on the mountains, the roadsides, the commons, the bogs, anywhere almost, yet responsive to better feeding—hardy, active, scarcely bigger than a donkey; she gives a suprising yield of milk, whose quality is in the first rank, and she is being a good deal sought after in these latter days." The above information is gleaned from the journal of the British Association in the report of a visit to an Irish farm with 260 acres of reclaimed mountain pasture, exclusively stocked with Kerries and now numbering over one hundred head.

Vocal duet, "The Gypsies"—Brahms; Mrs. Hazen and Miss Topping.

In response to an enthusiastic encore, Mrs. Hazen by request, sang "The Swiss Echo Song."

Mr. Tenney: "I move that a hearty vote of thanks of the Illinois Dairymen's Association be tendered to the Ladies of the Seminary, who have favored us with this beatiful music this evening."

The motion was unanimously carried.

The convention adjourned to meet at 9 A. M. the next day.

THIRD DAY—FRIDAY, DECEMBER 16, 1887.

The convention met pursuant to adjournment at 9 A. M.

DAIRY EDUCATION.

W. W. HAYES, *Prairie Farmer*, Chicago:

For our purpose those interested in dairying may be divided into five classes. Those farmers and dairymen outside of the influence of associated dairying constitute the first-class. They keep some cows, yet are not in localities where dairy knowledge is disseminated by central creameries or factories. They are by far the hardest class to reach by any system of education. Prior to the adoption of associated dairying in any district the country storekeepers stand between the dairy and a now well educated market, and prevent farmers from learning its wants by telling the deluded dairywomen individually that they make perfect butter. A common expression of these women is that "mother made good butter and I learned of her twenty years ago. You cannot tell me anything about making butter." Doubtless that same mother made free use of the heated horse shoe in December and January to drive away the witches. "None are so deaf as those who will not hear." Here in the very heart of the associated dairying district much of the ignorance of this class has passed away, but there are parts of the state and immense parts of the country, at the south for example, where improved dairying is almost unknown. At present the agricultural and dairy press is the only means of reaching a very large part of this class. These people are unwilling to learn from papers until aroused by institutes, dairy meetings or in some other way. Enthusiastic dairy organizers would say that associated dairying cures all these troubles. But the whole country cannot go at making creamery butter and factory cheese. Horse, cattle, hog and sheep breeding business, grain raising, commercial fruit growing, and numerous other great

occupations need room, each in its special locality. Besides, if associated dairying spreads too rapidly, the supply will not be in such proportion to the demand as to maintain living prices. I am a believer in the so-called "dairy district." No matter what specialty farmers are in they desire to supply themselves with fresh butter and pure milk. Also near towns dairymen either north or south can do a good business by furnishing private customers with gilt-edged butter at reasonable prices. This class are outside of what we term "dairy circles." They rarely hear dairy speakers, or have dairy literature pressed upon them; neither are they constantly in contact with the associated manufacturer, who finds it to his interest that all patrons know something about good cows and the management of milk. Beef cattle men in some sections ridicule any apparent interest in dairy cattle or dairy talk. They laugh at the "hog-fat prices" of dairy butter, and suggest that dairying is a direct road to the poor-house.

In the second-class I have put those who sell milk or cream, or supply the same to their own partnership manufactory. They are in such close communication with the butter and cheese makers, or the milk venders, and through them with the markets, that they become pretty well educated in a practical way. If the leading spirits in creameries or factories are up in the business their patrons must learn or return to the more primitive way of making up little batches of butter at home. No one, however would be so rash as to assume that this class could not be further educated in breeding, feeding and managing dairy cattle, or in the care of milk.

The manufacturers and managers of creameries and factories form the third class. They need to know the ins and outs of the business thoroughly, both to conduct their work in the best manner, and to be able to instruct their patrons. They do not, as a rule, attend all dairy meetings and dairy shows, or look closely enough at what dairy writers and experimenters are saying and doing. They need to get together and be stirred

up, and brought to realize that all cannot be taught in one factory which is run in one way, always more or less faulty.

In the fourth class are dairy writers, teachers and experimenters. As a whole, they are not an insignificant force. The number of specialists in editing and publishing dairy papers and dairy departments in agricultural papers has grown from a quite recent beginning into a respectable number. Besides this there is much good seed sown by occasional writings of many dairymen, and by the few dairy books. The numbers of good dairy teachers in our agricultural colleges and elsewhere are not a class that boast much of their accomplishments. Those teachers in the institutes, or, as some one has termed them, "Agricultural colleges turned loose," are doing first-class work of its kind. They are waking things up at least. The other division of this class, the experimenters, are not a numerous lot, nor are they doing all that is asked of them. The fact is, few of them have been thoroughly trained in both practical and scientific experimenting. The few we have are self-made pioneers, who devote only a part of their time to dairy experimenting. There is now no institution claiming to be especially able to educate men for this line of work.

The last class, the consumers, need to be educated up to a far better appreciation of perfect condition and high flavor, as well as greater wholesomeness of high quality butter. No better mode presents itself than dairy shows in cities and elsewhere, in which the different grades of butter and cheese, good, bad and indifferent, can be compared. Spreading butter on crackers or some bread-like cake, prepared especially for the purpose, is better than the experts plan with knife or tester. Oleomargarine manufacturers, whatever else they may claim, never compare their goods with perfect butter. Dairy societies can do good work by educating the consumers of good butter and cheese. Dairy societies like this one should encourage all means of education and experimentation. First of all, men in our experiment stations, who are taking up dairy in preference to the many other promising fields of investigation, should be aided and

encouraged so long as they do honest work, even if is not of the highest order. It takes time to do a single experiment, and often longer to learn what is wanted. Practical dairymen should suggest the knotty, every-day problems to these men. Dairy organizations should see that a man capable of experimenting in dairying is placed in each of the forthcoming experiment stations, if so many such men can be found. Money does many things, and if a place is made in each of these institutions, and held open until good parties are found, the men will appear as soon as they can educate themselves for the work. Some of the graduates and students of our agricultural colleges will observe that it is to their interest to train themselves in the business. This association should see to it that the station in Illinois provide ample means for experimental work in dairying. Heretofore agricultural experimenters in this country have been scattered one more or less in each state. These men have necessarily spread themselves over nearly the whole field of agricultural work in response to the popular demand, but from this on there will be a strong tendency for each man to follow one or more specialties. Experimenting with dairy stock and in the manufacture of its products is one of the most difficult lines of investigation; but to the men who succeed there is honor and position. Professors Sanborn, Henry and Babcock should be especially encouraged to spend a good share of their talents in this kind of work.

The agricultural colleges stand in an important relation to this industry. Not that they have as yet done *very* much, but that they can do an important work. They have been slow in developing this department, just as with other lines of agricultural and industrial education. We must stand by and encourage these things until they grow. Every graduate of these colleges should be required to have both a practical and scientific knowledge of dairying, and should be given the opportunity, if he so desire, of becoming an expert experimenter. These institutions should be training schools where teachers, experimenters, and even writers, can go and learn the essential points

in dairying. If by means of short courses, as winter schools, they can reach the butter and cheese makers, and even the sons and daughters of dairy farmers, well and good. Their chief aim in this line should be to instruct those who will in turn be teachers. County and even township agricultural winter schools, in connection with academies, or maintained separately, have been suggested. I firmly believe that our agricultural colleges are preparing the teachers for such popular schools in some form, and I may not be going too far in predicting that farmers' institutes are awakening the farmers to a point where they will demand and carry out a similar plan. Agriculture in its various branches is too comprehensive to be taken any more than by piece-meal into our country schools. They are already too full of classes, and have all they can do in laying a foundation for an English education. Separate dairy schools like the pioneer one recently started by Mr. Lawrence Valentine, at Houghton Farm in New York, may prove to be the way of reaching the masses in the districts devoted especially to dairying, and will for the present, if successful, be training schools to produce more teachers, writers and speakers in this line. Similar schools in Ireland and some parts of Europe have proven that the results show in a better class of goods reaching the markets where they have been located for a few years. But for sections where mixed farming is practiced dairying will naturally be only one of several things taught in farmers' schools.

Farmers' institutes for the immediate present have more of promise in them than all other educators. They not only give a great amount of information, but they make a demand for dairy papers and books, farmers' schools, and more institutes. They, and the use of some of the "Hatch" experiment funds, also agricultural colleges, are the things to be pushed now. Popular dairy schools *may* come in their own time.

WILLET M. HAYS.

THE GATHERED CREAM SYSTEM.

By J. B. BERTOLET, Leaf River, Ill.:

The subject assigned me is one of considerable extent and importance and should be represented by one of more ability, if not experience. Much talk and money have been expended on the various phases of manufacturing butter from gathered cream, yet all along the line of practical operation we are confronted with interrogation points, that, so far, as a rule, have not been answered by a desirable balance sheet at the close of the year.

As to nearly all questions, so to this, there are two parts, the theory and the practical. The former is ably discussed and commented upon by the editors and writers of our agricultural and dairy papers, and their readers are apt pupils, and the farmers and dairymen of America are to-day in their line the greatest theorists of the world. Any farmer of ordinary attainments can inform us what breed of cattle are best adapted for the dairy, knows how to shelter them, can explain the quantity, quality and condition of the requisite food as well as the proper time to give it to make the investment profitable. So, also, the dairyman understands the proper handling of milk, the successful raising of cream and the production of a superior quality of butter; is thoroughly posted as to the merits of improved dairy utensils; knows the importance of cleanliness, and the sensitiveness of milk, cream and butter in partaking of or becoming tainted by surrounding odors; knows that good results can be obtained only by the use of a tidy, well-ventilated, isolated and exclusive milk house, a well constructed tank with water, kept at a low and even temperature by frequent or constant change during warm weather. And, in short, the theory of dairy farming has attained quite a state of perfection.

This theory carried into practice should show profitable results that could be demonstrated by improved account sales, better market reports and general prosperity. How well the

theory is carried out in the practical, becomes apparent upon an examination of our daily market quotations, which show the amount and grade as well of stock daily sold at prices ranging from \$2 to \$6 per hundred, from which it is easy to ascertain the per cent. of canner's stock and of export. So also the number of pounds of butter daily sold on our markets, as grease and packing stock, and at less than 10 cents per pound, shows a wonderful neglect of theory in practice.

This neglect is further shown by setting milk for raising cream in living or cooking rooms, where smoking is frequently tolerated, by storing in open vessels, in dingy, mouldy and poorly ventilated cellars and in close proximity to decaying vegetables; by tolerating it to remain in shiftless milk houses without ventilation or drainage and surrounded by wallows, filth or garbage; by substituting oil barrels sawed in two for tanks and allowing water to become warm and stagnant, or by trusting to an opportune shade tree for protection from the scorching rays of the sun, at least part of the day. This neglect stands as the *greatest* menace to the profitable operation of the creamery using gathered cream. As is the cream we buy so will be the product we sell, and though fortunes have been expended, time wasted and patience exhausted, yet no "doctoring" has yet been able to produce "gilt-edge" from tainted cream, and never will.

My experience in this business dates back to 1881, and may be thus related: Having formed a partnership with our worthy president we formulated a theory of operation with the motto "Excelsior" written over the doors of our factory and a determination to make none but first-class goods and handsome profits. Creamery men, then old in the business, informed us that our theory was too fine, and our standard too high; that they had, and we would soon discover, a tendency to work for quantity at the expense of quality; that there have been tendencies to verify such prediction is too apparent to be denied.

At first we operated by having our gatherers do the skimming, gathered cream daily and bought by the inch, allowing

one pound of butter for an inch and a half of cream on a nine inch can, or 95.4 cubic inches to the pound. 95.4 cubic inches of cream raised at a proper temperature and measured at a certain age will make a pound of butter, but at a low temperature will not. This discovery was made by our patrons, who began investing money in ice houses indirectly at our expense. The consequence was that we were forced by a continually increasing shortage, to abandon this plan and adopt the Andrews & Burnap's test system. We now buy cream under this test and pay for actual yield. Under this system we gather twice a week during winter, and three times a week during the summer.

A careful operation of this test will render to each patron his just dues; and I deem it proper to state that all gathered cream should be bought subject to a test, as to yield, to protect the patron, as well as the factory. And with a judicious system of testing, a uniting of factories to refuse all poor cream and a co-operation of the farmer to improve in quality as well as quantity, there should be nothing in the way to operate creameries under the system of "gathered cream" profitably both to the factory and the patron. Such a state of facts is, however, far from existing in Ogle county to-day. The opposite seems to be the rule. The proprietors are largely at war for territory and over price of cream.

The price being the same for all cream, the patron is left without any incentive to improve the quality of his product.

The outcome of this is an independent indifference in the direction of improvement on the part of the patron and even a suggestion from the factory is frequently insolently met with the reply: "You take my cream as it is or leave it; my cream does not go begging for a market."

Another annoyance is the fact that creameries are beginning to be too numerous and the territory and patronage too small to profitably support all. A certain amount of expense is necessary in the operating of a factory, and the larger the patronage the smaller the per cent. of the expense; and the over

crowding of creameries is continually increasing the per cent. of expense.

One of the growing drawbacks to the creamery is the great number of the would-be gatherers who are frequently paid a stipulated amount per pound of butter gathered. These men by getting constantly in contact with the patrons will ingratiate themselves into their good graces and shortly claim an ownership of the route and dictate terms to and for the factory. New routes are thus frequently started in territory lying nearly equal distances from two or more factories, and usually among dissatisfied patrons when terms are made with the factory that offers the best inducements or largest pay. These routes are generally kept up for a short time only and disappoint patrons who become disgusted with the system of gathering cream. Patrons in such divided territory showing a preference first for one factory then for another have an influence upon friends and relatives living contiguous to other factories, induce them to change thus breaking up other routes and cause useless travel. I have now in mind a certain road that is being traveled by teams belonging to three factories, causing a travel of thirty miles where ten miles should suffice. Gatherers contesting for territory and patronage are not known to refuse cream in bad condition. Quality is lost sight of. Quantity their aim.

Permit me to state as an axiom, that there is no permanent profit in the manufacture of a poor article, and especially is this true of the food products, and to none of these does it more forcibly apply than to the products of the dairy. The American people are worthy of and desire the best article in our line, and are willing and able to pay a price that affords a profit for its production, and knowing these facts, it is to be hoped that we may benefit by past experience and hasten the day when we can agree upon such a division of territory and patronage that will enable us to pay better prices, curtail wasteful expenses and increase our profit.

We should be induced by a knowledge of these facts (if not goaded to it by our meagre profits, present losses) to have our

products brought to a standard honored in every market. Yes, these facts and their guaranteed results will induce us to agree upon a higher standard, insist upon its being carried out by advancing in price and by refusing all cream that fails to reach such standard. Then, and not until then, will the system of manufacturing butter from gathered cream become one of pleasure, success and profit.

DISCUSSION.

The Secretary: "I have no doubt this is a subject upon which there will be a great deal of discussion. It is very true, as Mr. Bertolet has said, that the grade of creamery goods is slowly, but surely, going down, while on the contrary, public requirement is slowly raising the grade. The introduction of the creamery system on a large scale was the means to raise the grade of butter throughout this country, and to a certain extent has made the creamery distance the dairy. But I must say to you gentlemen, who represent the creamery interest, the day is not far distant unless you take quality into greater consideration, when the dairy will leave you back in the shade."

Mr. Harrison: "There are plenty of questions to be asked on this subject and also a little experience to relate. We began the business nearly a year ago and feel that we are very young in it."

The President: "How did you come to go into it?"

Mr. Harrison: "I attended one of these dairy conventions. I will tell you how I kept out of it as long as I did. I bought a little cream of my neighbors and I had not been paying special attention to the yield of cream, but I had heard and believed that an inch of cream made a pound of butter. I was filling a contract for butter and needed a little more cream than I had from my own cows and so I bought from my neighbors and they are just as nice people as can be found anywhere. The man who made the butter said, 'That cream don't make a pound of butter to the inch,' and the first I knew I lost more on the cream I

bought than I made on all I had of my own. Well, I thought I knew then how so many creameries came to break up financially; I concluded that the creameries paid for what they didn't get. I had heard something about an oil test, but I didn't suppose that referred to butter; I didn't have the remotest idea that the oil test referred to testing cream, to see how much butter there was in a given quantity of cream. I went down to Aurora last year to one of these dairy meetings and I ran across several creamery men, and I learned there what an oil test was. Their experience in using that oil test was so satisfactory and they told me such good results were obtained from it that I began to think if they could run an oil test and tell every time how much butter there would be in a certain amount of cream, perhaps I could do it too. I got one. We weighed the butter every day; we churned about 200 pounds a day. We would take a sample of course, and churned it and then we would take a sample of the cream as it was in the vat and compare. We kept this up for the first two weeks and I assure you we were surprised after all that we had heard to find that it did do what had been credited to it. Thus we found we could tell how much butter we were getting out of the cream and so we got into the creamery business. The next trouble that came was the quality of the butter it produced. At first, when we made 100 or 200 pounds, the commission men wrote back, 'The flavor is A 1.' Pretty soon the word came back, 'The flavor is off,' and the price was off too, I assure you. My butter maker makes butter for me on shares. I began to think there must be some way to get cream that would make the original good quality. When we had one or two samples of cream we could manage this matter of quality pretty well, but when we began to have 700 or 800 pounds of butter a day, it got beyond our control and I said to the drivers, 'We don't want any thick cream; you tell people we can't use it.' But I couldn't get the drivers to carry this out, and my butter maker could not do it. I had to give that up. I could not get the men to be particular enough in gathering the cream, but what I got enough bad cream to keep the quality of the

butter down, so there was nothing to make from gathering the cream. I said to my butter maker, 'Let us pay more for the cream of a certain grade than for others.' He was afraid that would not work, a good many of our patrons would quit. We hesitated for a while and didn't try it as long as he was in partnership with me. Finally I got the matter in my own hands, and I made up my mind that I would try it anyway even if I lost patronage, and I talked with a few of the patrons about the matter and took counsel with energetic men of business in my neighborhood. I said, 'There is a great distinction made in butter, and it seems to me only fair that there should be a distinction made in the cream.' I said that to one man a patron of the creamery, who does a large business, but had never thought of this idea at all. He said, 'Certainly, that's all right,' and he was one of the very men whose cream graded down low, but he was able to make the improvements necessary to do better and when he found out about it was willing to. I found that the sensible men generally looked at it the right way. One said, for instance, 'As long as a man knows that the rest of the patrons set their cream out in the sun and take no care of it, what encouragement is there for him to care for his, and give you a first-class article. As soon as he knows he will be paid to take care of his cream you will find he will be willing to do it.' I started in then to try the experiment. For cream that was perfectly sweet I paid two cents more than I did for sour cream. I didn't know whether that would make the difference in the price of the butter, although I believed it ought to, and I have proved that it would. Butter made from the sweet cream brings me more money; my commission men in St. Louis never offer less than two cents more, and it moves off at once, it don't lay in the commission men's hands several days before they sell it, and often I am not offered within five or six cents for the sour, what I am for the sweet. Now, don't you think, friends, that it will pay you patrons to take the necessary care of your cream? The creamery man cannot pay more than he can re-

ceive for his goods unless he has a bank, and there are not many bankers running creameries."

Mr. Tenney: "How many patrons did you lose in making this change?"

Mr. Harrison: "Well, I heard there was a man came to a store in the neighborhood and gave me a genuine cursing, was going to start a rival creamery, and kicked up a row generally, but I don't know that I lost one patron."

The President: "Do you churn you cream sweet?"

Mr. Harrison: "No, sir; I did not explain why I wanted it sweet, I thought creamery men would know the reason why, but I had to explain it to the patrons a good deal. A good many of them refused to give me sweet cream because they thought I was going to churn it sweet, and would not get so much butter out of it. They said, 'Sweet cream will yield that much less butter, and there's only two cents difference, and therefore it won't pay us.'"

Mr. Sawyer: "Do you handle your samples, sweet cream samples, and sour cream samples?"

Mr. Harrison: "Well, we do when there is a requirement for it. I would not know how to handle them differently and obtain different results. We get a very clean separation. The sour is no better than the sweet, and our sweet cream samples in the oil test are just as complete and perfect as the sour cream."

The President: "Do you think you will get the same return from testing a vial of sweet cream that you will a vial of sour cream?"

Mr. Harrison: "We don't test it sweet."

Mr. W. R. Hostetter: "Do you expect to gather in that same way in the summer?"

The President: "Every straight, square man that raises cream can just as well keep it sweet as sour if gathered every day of course."

Mr. Tenney: "Then, am I to understand that it is important that the samples should be sour before churning?"

The Secretary: "Yes, quite so, to have the test uniform."

Mr. W. R. Hostetter: "Is there any diversity of opinion among the gentlemen of the convention in regard to that?"

Mr. Bertolet: "We consider that they must be all sour."

Mr. W. R. Hostetter: "I think I have heard Mr. Gurler make the statement that he could see no difference between churning sweet and sour in the quantity of butter he made."

Mr. Monrad: "It has been tested and found that the difference would average six per cent. less on sweet cream than sour. That is by government experiment."

The President: "I think that point is distinctly understood by creamery men, that the cream must be soured to get full yield of butter."

Mr. Harrison: "You asked me about how many patrons quit on the sweet cream business. I tell you there were a good many quit on the test business. All the trouble put together in the other matters does not equal the trouble in the one matter of tests. There is a continual growling and complaining by patrons in regard to the tests. I try to impress my patrons with the idea that any time they want to quit we will be just as good friends as if they continued. I have lost very few on any score that I have not succeeded in getting back, but I do not think the test gives satisfaction. For instance, one man says, 'My cream churns so much to the pound; your test says differently.'"

Mr. Tenney: "What you want to do with the man who says that is to ask him to come into your factory and see just how it is done. The fact is, that so many patrons will let their cream stay on the milk until the cream becomes sour and lobbared and it is impossible to get that out of the butter."

The President: "In plain English, you think there is more caseine in the dairyman's butter than in the creamery man's?"

Mr. Tenney: "That is it. I have had a good deal of complaint in that particular, and to satisfy myself I told my butter-maker to hold over one churning of cream an extra twenty-four hours, and he did so. I took a sample of butter churned in the ordinary way the next day after it was gathered, and

then I went to one of our grocery stores and got what they call a fair sample of country butter. I took the three samples, put them in the test bottle, melted them and set them away. If any gentleman will try that and show the result to the man that sells the cream, he can certainly convince him if he is a reasonable man."

Mr. Harrison: "I went a little further than that. I told one of these gentlemen who claimed so much for his cream, that if he would bring his cream to the factory we would churn it, and that if his cream ever made more butter than the test showed he ought to have, that I would pay him the difference. He brought his cream into the factory and we churned it and we made a pound and one-tenth to the inch, the very cream he had claimed would make a pound and a half. He wasn't satisfied with that. He said, 'I can make more butter out of it.' We churned ten inches of cream in a one hundred and fifty gallon churn, but we poured in as much water as there was cream, so it did not adhere to the churn; now, I would like to know whether I got all the butter out of that churn?"

Mr. Bertolet: "I think there is no doubt about it; you got it all out."

Mr. Harrison: "If this gentleman really did make a pound and a half of butter to the inch of his cream, and I could make only a pound and one-tenth to the inch, and the difference in weight is made up by caseine in that proportion and that is all right, we want to know it."

Mr. Boyd: "I think this difficulty can be explained on business principles. The prime trouble in the whole matter, in my opinion, is this: That patrons' cream tests ten per cent., we will say, the next man's tests fifteen, the next eighteen, and the next twenty; there is no uniformity in the cream. The consequence is, there is a dissatisfaction at once, the fellow who furnishes the purest cream tests the highest. Now, there is one way of overcoming all this difficulty, and that is in getting the cream in a uniform condition. I do not say that even in the most uniform condition there won't be some variations, but the

variation will be so slight that it will overcome all the difficulty of dissatisfaction."

The President: "I am glad Mr. Boyd has made that point. His way is to have all the cream uniform."

Mr. Boyd: "With any can that will make it uniform."

Mr. Potter: "My experience has been that a certain quantity of milk or water improves the quality certainly, and the quantity a little. I never was able to get good results from heavy, thick cream."

The Secretary: "There were some tests made in the city of St. Louis involving the integrity of some business houses there in connection with an oleomargarine investigation. There were butter tests made there, and as I remember seven samples were procured from Elgin and other factories, Iowa, New York, Pennsylvania, and I think in all some eighty odd samples were tested, all creamery goods; the object was to ascertain what the standard was for butter in the United States. Prof. Dettmer made the experiments, and it was decided that standard should be eighty-six per cent. butter fat. The samples of butter I think varied from seventy-eight and a half up to eighty-eight and a half per cent. The amount of caseine incorporated in the poorer butter was a poor investment indeed, destroying the keeping quality of the goods, while it had no immediate effect except, perhaps, showing in white specks, still proving that it is wretched policy to make extra weight in butter and have it run lower in quality. When you add six or eight or ten per cent. to the quantity you are so deteriorating the quality that the loss will accrue in the end. Quality should be a prime object, with a due regard to quantity as the next consideration in importance."

Song, "Rocked in the Cradle of the Deep"—J. G. Lumbard.

The president stated that the awards on the butter display were ready for announcement.

Mr. Chester: "I wish to say before the premium list is read that it has been my misfortune to have had to handle the score cards for quite a number of dairy shows. I want to say to the exhibitors who have made the exhibit here that I never handled

a set of score cards that were so far up, so near perfect as the score cards in this show."

The secretary then read the complete list of awards as follows:

Lot 1.—Best dairy butter, Illinois:

First. F. S. Stockwell, Belvidere.

Second. W. R. Hostetter, Mt. Carroll.

Lot 2.—Best dairy butter, other States:

First. P. L. Younker, Hampton, Iowa.

Second. F. D. Holmes, Owatonna, Minn.

Lot 3.—Creamery class, whole milk, Illinois:

First. Birt Victor, Lily Lake.

Lot 4.—Creamery class, other States, whole milk:

C. B. McCanna, Burlington, Wis.

Lot 5.—Gathered cream, creamery, Illinois:

First. L. McDonough, Davis Junction.

Lot 7.—Dairymaid's class:

First. Miss Mettie Bailey, Mt. Carroll.

Second. " Emma Poorman, "

Third. " Clary Gordon, "

Fourth. " Edna B. Melendy, Thompson, Ills.

Lot 8.—Young men's class:

Matt Hinley, Stillman Valley, Ills.

Lot 9.—Sweepstakes class, Dairy:

F. S. Stockwell, Belvidere, Ills.

Lot 10.—Sweepstakes class, Creamery, best Creamery butter whole milk:

Birt Victor, Lily Lake, Ills.

Lot 11.—Best Creamery butter, gathered cream:

L. McDonough, Davis Junction, Ills.

Lot 12.—Special for Illinois Dairy:

First. F. S. Stockwell, Belvidere.

Second. W. R. Hostetter, Mt. Carroll.

Third. J. S. Dresbach, " "

Lot 13.—Special Creamery sweetstakes:

First. (5 gallons Hansen's color, 5 sacks Genesee salt,)

L. McDonough, Davis Junction, Ills.

Second. Birt Victor, Lily Lake, Ills.

SALT SPECIALS.

Lot 14.—Ashton:

F. S. Stockwell, Belvidere, Ills.

Lot 15.—Hawleys:

First. F. S. Stockwell, Belvidere, Ills.

Second. Birt Victor, Lily Lake, Ills.

Third. C. F. Tenney, Bement, Ills.

Lot 16.—The Warsaw Salt Co.:

First. L. McDonough, Davis Junction, Ills.

Second. T. H. Baker, “ “

Lot 17.—Higgins':

F. S. Stockwell, Belvidere, Ills.

Lot 18.—M. S. A.:

(Premium divided)—Jonn B. Petty, J. S. Dresbach, Mt.
Carroll, Ills.

Lot 19.—Perfect:

F. S. Stockwell, Belvidere, Ills.

Lot 20.—Perry's Butter Color Special:

First. F. S. Stockwell, Belvidere, Ills.

Second. John B. Petty, Mt. Carroll, Ills.

Lot 21.—Fargo's Butter Color Special:

First. F. S. Stockwell, Belvidere, Ills.

Second. J. S. Dresbach, Mt. Carroll, Ills.

Lot 22.—Wells, Richardson & Co., Color Special:

First. Miss Mettie Bailey, Mt. Carroll, Ills.

Second. N. B. Merchant, “ “

SPECIAL SWEEPSTAKES.

Lot 23. } L. McDonough, Davis Junction, Ills., best butter made
 Lot 24. } in Illinois.

Lot 25.—Best package of butter made outside of Illinois:
 P. L. Younker, Hampton, Iowa.

GRAND SWEEPSTAKES.

Best butter in the show:

L. McDonough, Davis Junction, Ills.

Lot 27.—Dairy butter display:

First. Mrs. W. Wicks, Mt. Carroll, Ills.

Second. W. R. Hostetter, “ “

Lot 29.—Lowest score in show:

Miss Rose Demmon, Mt. Carroll, Ills.

Lot 32.—The best twelve pails of Dairy butter in Illinois:

1. F. S. Stockwell, Belvidere, 93½.
2. W. R. Hostetter, Mt. Carroll, 91.
3. J. S. Dresbach, “ “ 90½.
4. J. R. Gaston, Normal, 90.
5. T. J. Smith, Mt. Carroll, 85½.
6. Mrs. W. K. Stakemiller, Mt. Carroll, 83½.
7. Mrs. A. D. Bliss, Marengo, 82½.
8. J. S. Ashby, Mt. Carroll, 82½.
9. Mrs. H. B. Poorman, Mt. Carroll, 82.
10. Jos. Sharp, Mt. Carroll, 82.
11. Clary Gordon, Mt. Carroll, 80.
12. Mrs. Jennie H. Stakemiller, Mt. Carroll, 79½.

Lot 32.—The best twelve pails of butter made outside of Illinois:

1. P. L. Younker, Hampton, Iowa.
2. F. D. Holmes, Owatonna, Minn.
3. Lorena A. Morse, Manchester, Iowa.
4. Flora M. Crosby, “ “
5. Watson Childs, “ “

6. John Dubois, Manchester, Iowa.
7. J. A. Morse, " "
8. Jane Fraser, " "
9. A. M. Bingham, Jessup, Iowa.
10. C. W. Lyman, Manchester, Iowa.
11. F. P. Ryan, Golden, Iowa.
12. C. B. McCanna, Burlington, Wis.

The committee appointed to report on dairy implements and appliances submitted their report as follows:

Your committee having examined the entries of dairy implements and appliances have awarded diplomas as follows, to-wit:

Lot 30.—Best display of creamery apparatus:

Western Dairy Supply Co., Chicago, Ills.

" Best display of dairy butter making apparatus:

Haney & Campbell, Bellevue, Iowa.

" Best display of butter and cheese color:

Western Dairy Supply Co., 19 Michigan Ave.,
Chicago.

" Best display of butter and cheese packages:

Davies Warehouse and Supply Co., 200 La Salle
St., Chicago.

" Best display of dairy salt:

The Warsaw Salt Co., Warsaw, N. Y.

" Best display of Refrigerating apparatus:

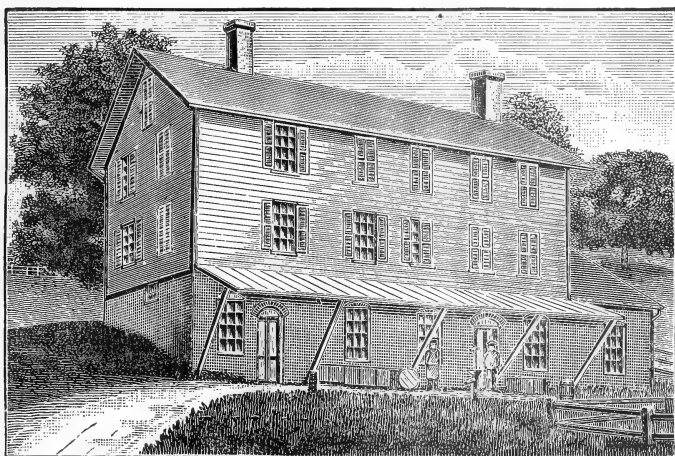
Haney & Campbell, Bellevue, Iowa.

Lot 31.—Grand sweepstakes best display of dairy apparatus at the show:

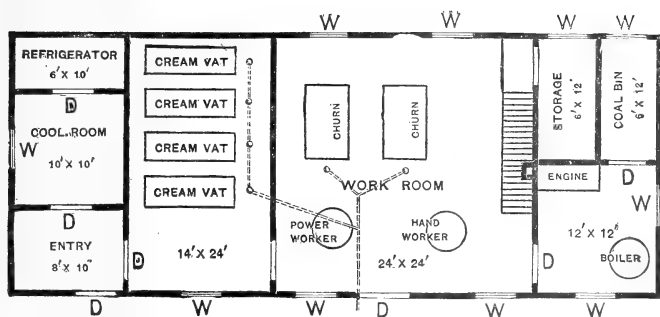
Haney & Campbell, Bellevue, Iowa.

Your committee were extremely happy that they were not required to investigate, or award diplomas on the merits of the appliances and articles entered in the above classes, as a large proportion of the same seemed so miritorious as to make comparison of individual merits almost invidious.

EDWARD E. GARFIELD,
A. M. C. TODSON,
J. B. BAKER, Committee.



{ ELEVATION.



A NEW ENGLAND CO-OPERATIVE CEAMERY—GROUND PLAN.

CO-OPERATIVE DAIRYING.

JOHN BOYD:

Uniformity and temperature are the corner stones on which good dairying is constructed, and there can be no success in the business without them. To produce butter of the greatest perfection and uniformity and find by joint action the best market for it is the office of the co-operative creamery.

I am well aware that the finest grade of butter can be and

is produced in the private dairy, where all the modern appliances, and the skill to use them, are at hand, but such a result requires an individual plant on a large scale, and even then in nine cases out of ten during portions of the year, there is an unavoidable lack of uniformity in the product. The premium butter makers well know that the finest, quickest flavored butter is made only from the milk of cows fresh in milk, and that the most skillful manipulation known to modern scientific butter making cannot impart that most desirable quality to butter made from the milk of cows in the advanced stages of gestation. If the average dairyman is oblivious to this fact, his cunning adversary, the butterine manufacturer, is not; he realizes that his purchases of butter must be made from the creamery that carries on winter dairying, and where the cows are fresh; in fact he will buy no other, but is willing to pay the highest price for this, that he may give to his neutral the flavor of the real stuff. I have often thought during our fight with butterine and oleo what a providential thing it was for the farmer that this fine aroma can be produced from no other source. Up to the present time science has not been able to counterfeit it, although all the sources at her command have been brought in play, stimulated by the gold of the counterfeiters of genuine butter.

A well organized co-operative system is the only remedy. Co-operation properly directed means strength, stability and success. The good effects of the co-operative creamery are seen in the patron's herd of cattle; as a natural consequence the cows are improved in in quality, because he measures the worth of his cows by the quantity of cream they produce. He can measure his cows by the spaces of cream, very much as Mr. Hiram Smith does his acres in milk, and the first thing he does is to discard the unprofitable cows and replace them with better stock. There is much more in this item than may appear at first sight: it affords the dairyman an easy method of testing his cows with no increase of labor; in fact it compels him as a mat-

ter of business to do what he otherwise would consider an unmitigated bore.

It teaches him how to feed for profit. It enables him to compare his own herd with the herds of other farmers, and the comparison stimulates him to do better. The co-operative creamery is most certainly a blessing to the farmers' wives and daughters, as it relieves them of all the cares of buttermaking. One housewife said to the president of a creamery the other day: "I'll give all my old shoes if you will get my husband to "send his cream to your creamery."

The cash returns come in frequently, and they lead the farmer to regard the dairy department, more in the light of a business than he ever did before, not as a side shoot too insignificant for him to engage his time upon.

The creamery system, as it has existed, and does to a great extent exist to-day, has worked wonders in improving the dairy butter of the country, but the recent developments in New England show most conclusively that there is yet great room for improvement; that the best results are not attained by the present methods in the west.

It is no exaggeration to state that not 50 per cent. of the actual value of the milk produced in Illinois, converted into butter, is realized by the farmers throughout the state. Within the past few years the farmers of New England have been establishing co-operative creameries on a new plan, and their success has been so great, and they have in consequence become so numerous that within the last two years their butter product has become a very important factor in the great markets of the east, and is beginning to have a perceptible effect on the prices of the best western product. From a small commencement a few years ago the co-operative creamery in the eastern states has now become a formidable competitor in the New York and Boston markets, and the number of creameries is not only increasing with unprecedented rapidity, but those already established are extending their business with astonishing strides, in unmistakable indication of success. They are disclosing new

avenues of economy in the business heretofore unthought of. You may form some estimate of their magnitude from the fact that within the last three years considerably over 100 co-operative creameries, on the plan I speak of, have been established in New England alone, and they are giving better satisfaction than anything that has preceded them in that line. The business of every one of them is largely on the increase; in most cases the annual product has been doubled and thribbled.

They are in every sense of the word co-operative; they return to every patron the full value of his cream, less the actual cost of manufacturing the butter. The secret of their success is in having adopted one uniform method of handling the milk and producing the cream; by that means they are enabled to produce the finest quality of butter, at a reduced cost, and get the best price for it. Its uniformity commands an extra price on the market.

The co-operative creamery commends itself to all classes of producers of butter, for the reason that it equalizes the value of all contributions with perfect justice to each one; it gives to the superior butter maker an increased return for his milk, with less labor expended, and it insures the maker of inferior butter a return greater than he can realize any other way from his milk.

It enables the farmer to utilize the skimmed milk on the farm to the best advantage; in fact nothing is wasted or lost to the producer. The consequence is, the cash returns are larger, and give so much satisfaction to the co-operators that the dairies in the east are being largely increased where they have heretofore been neglected, under the impression that dairying in the east could not compete with the west on account of the difference in the cost of feed.

It looks now very much as if it was only a question of short time when the west can no longer count upon New Englanders as consumers of western butter.

The capital stock of a co-operative creamery usually runs from \$1,800 to \$4,000, according to surrounding circumstances. The organization consists of a president, secretary, board of

directors, and a clerk, who are elected annually from the stockholders, and no person is allowed to hold stock who is not engaged in agriculture. The average capital is from \$2,000 to \$2,500, divided into 100 shares of \$20 to \$25 each, and this is ample to meet all the requirement of a prosperous business. It is not desirable that any one person should hold more than one share of stock. The business is first chargeable with interest at six per cent. per annum on the capital stock before any dividends are declared. You can form your own conclusions from the following figures, which are taken from the books of a few of the co-operative creameries in the east. They may be counted as reliable, for they were the basis of the settlement made between the co-operators and they have no object in concealing them, and nothing to gain by publishing them.

Amherst Co-operative Creamery, Amherst, Mass., 1886:

MONTH.	NO. LBS. BUTTER.	PAYMENT TO PER LB. OF BUTTER.
December, 1885.....	16,153.....	26.05
January, 1886.....	16,751.....	26.16
February, ".....	14,712.....	26.60
March, ".....	17,335.....	25.36
April, ".....	18,782.....	24.60
May, ".....	23,260.....	18.69
June, ".....	22,712.....	18.90
July, ".....	20,603.....	20.00
August, ".....	16,789.....	21.39
September, ".....	14,609.....	23.74
October, ".....	17,390.....	26.08
November, ".....	16,692.....	26.37

Total.....215,788.....Average....23.66

The business for three years—pounds butter made:

1884.	1885.	1886.
97,159.....	160,004.....	215,788

This creamery started late in 1883. In 1886 it had one hundred and fifty patrons; the number has been largely increased this year.

Wapping Co-operative Creamery, at Wapping, Conn., for eleven months of 1886:

MONTH.	NO. LBS. BUTTER MADE.	NET PER LB. TO PATRONS.
January, 1886.....	9,069.....	28.94
February, ".....	9,040.....	29.38
March, ".....	11,115.....	27.31
April, ".....	12,247.....	26.00
May, ".....	15,627.....	22.26
June, ".....	17,057.....	19.14
July, ".....	14,460.....	19.83
August, ".....	13,420.....	20.31
September, ".....	12,425.....	23.03
October, ".....	12,046.....	26.92
November, ".....	9,664.....	29.32

Total.....136,170.....Average.... 24.76

Canton Co-operative Creamery:

January, 1886....	7,369.....	27.37
February, ".....	7,250.....	27.41
March, ".....	9,147.....	26.52
April, ".....	10,572.....	25.24
May, ".....	16,304.....	20.50
June, ".....	17,926.....	16.94
July, ".....	16,047.....	16.83
August, ".....	14,513.....	18.45
September, ".....	11,699.....	22.29
October, ".....	10,610.....	26.76
November, ".....	9,231.....	27.20

Total.....130,668.....Average.... 23.23

Ipswich, Mass., Co-operative Creamery:

March, 1886.....	1,720.....	27.90
April, ".....	2,174.....	25.32
May, ".....	3,954.....	22.33
June, ".....	4,838.....	20.37
July, ".....	5,125.....	21.94
August, ".....	4,811.....	22.15
September, ".....	4,379.....	25.28
October, ".....	4,152.....	26.40
November, ".....	3,366.....	27.24

Total..... 34,519.....Average.... 23.33

North Brookfield, Mass., Co-operative Creamery.

MONTH.	NO. OF SPACES OF CREAM ON EACH CAN OF 17 QTS. MILK.	AMOUNT PAID FOR CREAM ON EACH CAN OF 17 QTS. MILK.	
Jan. 1886.....	11.25.....	42.19	
Feb. ".....	11.09.....	41.59	
March ".....	10.79.....	43.16	
April ".....	10.63.....	38.48	
May ".....	10.84.....	28.52	
June ".....	10.78.....	28.25	30 to 60
July ".....	9.72.....	28.16	patrons
Aug. ".....	10.05.....	32.66	700 to 1200
Sep. ".....	10.38.....	36.33	cows.
Oct. ".....	10.18.....	40.72	
Nov. ".....	10.63.....	47.22	
Dec. ".....	11.11.....	45.18	almost
			2.24
Average No. spaces	10.54.....	37.71	pr. qt.

The business for 1885. 1886.

Pounds of butter... 37,098..... 94,155
Expenses per pound. 5.20..... 4.40

The total expenses in these creameries are from 3 cents to 6 cents per pound of butter, according to kind of stock kept, amount of butter made and general management; this includes cost of collecting cream also. The average cost per pound of butter in all the New England creameries last year was $4\frac{1}{4}$ cents.

The better the cow the more spaces of cream, and consequently the greater the profit. Some dairies averaged 14 spaces of cream per can of milk for the eleven months ending December, 1886, when it required an average of 6.50 spaces for 1 pound of butter. There were instances of 21 spaces per can of milk of 17 quarts.

At the Ipswich, Mass., creamery, during nine months, ending November 31, 1886, W. F. Kinsman was paid \$592 for the cream from ten Jersey cows. For the same time W. B. Kinsman was paid \$347 from seven common, mixed grade cows.

I. P. Gardner kept ten Jersey cows; made 15 pounds of butter

per week for his own use and sold the balance of his cream for \$536 during the nine months.

I. F. Given kept five cows, the cream from which brought \$276.

The town farm sold from seventeen very common cows \$742 worth of cream.

If these parties had as much cream during the remaining three months of the year as they had in March and November, or at that rate, they would have had \$90 a piece for the cream from Jersey cows and \$75 each for the commonest kind of cows.

C. D. Sage, of North Brookfield, averaged 14 spaces on each Cooley can, of seventeen quarts of milk, from grade Jerseys during the first eleven months of 1886. The average price paid per space during that time was 3.52 so that Mr. Sage received \$49.28 for the cream from seventeen quarts of milk, besides having the skimmed milk left; this is equal to 140.80 per 100 pounds of milk during the eleven months. Skimmed milk divested of every particle of butter fat, contains 10 per cent. of plant food, made up of lime, magnesia, nitrogen, phosphoric acid, potash, and other substances which have their place in the vegetable economy, as against 12 or 13 per cent. in full milk. Now take it for granted that no dairyman should be satisfied with a less yield of milk from each cow kept on the farm than 5,000 per annum, which is equivalent to 500 pounds of plant food contained in the skimmed milk of an average cow for one year; multiply this amount by the number of cows in the herd and you have the annual drain upon your land from this source, where the milk is sold from the farm. Continue this process of depletion for series of years and you can no longer wonder at the exhausted condition of the soil. The fact is selling the milk is equivalent to selling the fertility of the land.

ADDRESS.

HON. JOHN STEWART, Elburn, Ill.:

Ladies and Gentlemen—I have only a few words to say to you in regard to the running of this dairymen's institution as it

stands towards the state of Illinois. It is known perhaps to many of you that that the state legislature, as usual, granted \$500 only for the purpose of publishing and showing to the state at large the proceedings of this dairymen's yearly meeting. Last year it was almost an impossibility to get the bill through; in fact, it failed some three different times to get a vote to carry it through, a large portion of the southern part of the state claiming that it is merely a local institution and that they might as well throw \$500 into any private institution as into this. It was claimed that a large portion of the state never saw any books printed, and even many of the legislators said, "You want \$500 to print books; we never see any." I had to give them my word that we would appeal to the managers this time to get out a neat book and send them a number of those books and give them an idea of the extent of this interest all over the state, and I understand that it is the intention to do so."

The President: "On the part of the association we will agree that Mr. Stewart shall see as finely a bound volume of reports as ever was gotten up, and a copy of it shall be sent to every member of the legislature, and if we can't move on them that way, I don't know how we can."

The Secretary: "I wish to say that we have a query box. In order to help us in putting before the dairy people those questions in which they are interested, we would request any of you who have any question you wish answered, or any plan you desire to suggest in relation to the dairy or agricultural subjects, to put the same in writing and hand them in and they will be answered, either from the platform here by practical people who know what they are talking about, or through the printed report of the proceedings of this association, or in the regular bulletins which it is proposed to issue, by the most prominent men in the country upon the various subjects that will be called for. If we cannot find men among us to answer those questions we shall go to work and use the information of the press and of men in other sections posted on these various matters and give them to you."

DEHORNING CATTLE.

E. E. GARFIELD, La Fox, Ill.:

Mr. President, Ladies and Gentlemen: Having been reared upon a farm, and having been elected and duly installed as the cowboy of the family, at the age of ten, the writer's attention was early drawn to the cruelties and dangers arising from the presence of horns upon domestic neat cattle.

The impressions caught from the sympathies and fears of the boy, have neither been obliterated nor allayed by the experiences of the man. What, with being often called upon to save the life of a valuable cow from being an unwilling sacrifice to the whims and caprices of her playful sisters, with seeing one brother nearly stripped of his clothing by the careless toss of a bull's horns: another escaping goring by an excited cow only by reason that nature through the agency of an extremely cold winter had dehorned her, if more evidence were needed to convince him of the worse than uselessness of horns aforesaid, it was duly presented in a little discussion which the writer himself once held with a sportive bull, alone upon the prairie.

The argument was "short, sharp and decisive." The result was such that he has never, since the occasion mentioned, been known to dispute the physical superiority of a pair of "short horns," backed by twelve hundred pounds of beef, to one hundred and sixty of "adipose tissue" in the human form. From the stand-point of previous experience he was prepared to hail with delight the information received from an article in the *Western Rural and Stockman* from the pen of Mr. H. H. Haaf to the effect that horns could be safely and easily removed from the cattle of all ages with no serious liability to ill results arising therefrom.

The resolution to experiment once formed, a pressing occasion soon followed.

A vicious bull was roped and quickly despoiled of his offending members. Ill results noted—none. Good results—a quietus for some months of the fighting propensities of the bull

in question. And, when eight months later the impulse to gore returned the partial harmlessness of his condition became apparent.

The fact, which I deem indisputable, that this experiment saved one human life is the best credential and argument I have to offer of the value and practicability of the proposition of dehorning grown cattle.

Encouraged by one experiment another soon followed.

This time about thirty head of young cattle were the victims. Again the same lack of ill results followed.

Next, about forty cows in milk passed under the saw.

In this case a loss in milk was observed of about ten per cent. for two or three days, after which the usual flow returned and continued, more even in quantity during the remainder of the season than at any previous time.

Altogether about one hundred operations have been performed by the writer, and in no single instance has any animal refused feed for the space of half an hour after being dehorned; from which the conclusion is drawn that in devastating influences upon the animal the operation bears no comparison to the more common one of castration.

But say the tender hearted, surely it is a cruelly painful thing to do. Other devout friends are just a little alarmed lest in assenting to these views they may be caught charging the "Great First Cause" with folly. All ask, "of what use?"

No doubt in the aeons of the past, in the ages prehistoric, wherein our good Bro. Darwin seems to think that he has discovered his progenitors, and our own, in the fierce gorilla and the grinning ape, when physical process alone settled the momentous questions of the "survival of the fittest," it did seem good in the council of Omniscience to endow the bovine race with "fixed bayonets," for their protection and preservation. But when civilized man for his gain, threw his protecting arm into the arena, the conditions at once began to change, and horns began slowly, steadily to disappear, as if at the command of all creating nature herself.

That this is no fanciful figure witness the fact that for a century the words "Short Horn" have been a synonym for the grandest achievement of man's care and thought in feeding and breeding neat cattle.

And now we urge, the time has arrived for the total excision of all remaining horns.

To what end?

First, the danger to human life and limb will be reduced thereby fully ninety-five per cent., a result of no small proportions, and much to be desired.

Again, dehorning, while not changing the avoirdupois reduces the bulk of the animal about four hundred per cent., and increases its docility in the same heroic ratio.

MATHEMATICAL DEMONSTRATION.—The space at the water tank, the feed rack, or in the shed, that only affords a "fighting chance" before, will easily accommodate four such animals after dehorning.

Again, Bro. Haaf, after several years observation in this line, estimates that from fifteen to twenty per cent. of necessary feed is saved by the operation. I should vary the proposition, saying that from fifteen to twenty-five per cent. better results are obtained from the given feed thereby.

Query as to cruelty.

Does the pain given during the operation compare in degree or amount with the misery saved to the animals themselves thereby?

After two years close observation on this subject I am able to say emphatically, no.

The cruelty is all on the side of leaving the horns unmolested,

All observing stockmen are aware of the fact that in herds of any size the weak majority live in continuous fear of the strong minority, ever on the ragged edge of expectancy, ever on the alert to avoid the bayonet thrusts of their physical superiors.

Should such a condition be suffered, or abolished, if such a thing be possible?

I know that Falstaff says that "grief puffs a man up," but I know another thing, paroxysms of fear never made a pound of beef or helped to fill a milk-pail.

How to do it.—Lash the animal's head thoroughly and securely to some firm object. *Save the head and ears* but remove *all the horn*. This short rule covers the whole ground.

Perhaps we might add a postscript for the benefit of nervous operators. Lose no sleep as to results. Results will take care of themselves.

In conclusion no risk is incurred in avowing that any observing, reasoning man, however averse he may be to giving pain to any living thing, who will thoroughly investigate this subject will concur in the proposition that the God-like quality of mercy, which the poet declares:

"Is not strained,
But droppeth as a gentle dew from heaven,
And is twice blessed:

Blessing him that gives and him that receives,"
is most honored, best exemplified by depriving unreasoning brutes of the power to injure their own kind or their human protectors. For myself, I should feel guilty of culpable negligence toward the safety of my family, my domestics, my animals and my bank account, were I to allow my dairy herd the unlimited use of their horns.

EDWARD E. GARFIELD.

LaFox, Ills., Dec. 12, 1887.

THE DEHORNING QUESTION.

H. H. HAAF, Chicago:

Mr. Chairman, Ladies and Gentlemen: There is a good deal to be said on this subject, and a good deal that cannot be said to-day. I am here simply because in my heart of hearts, I have wondered why it is that the dairymen of Illinois and elsewhere, while they are so intelligently discussing the subject of

cream, do not see that the best cream cannot be produced by brutes that are in perpetual fear of one another.

When a man asks me what dehorning means I tell him it means peace and quiet in the dairy, it means success every time, it means fat and butter.

I have heard many people say, "Why did God put horns on cattle if they are to be cut off?" Why did God put a wart on your face and then allow your mother to have it removed because she thought it was an unnecessary excrescence? Why are some men and women born cross-eyed? The fact is, God has given us our faculties and we are to improve them and ourselves.

Originally cattle ran where there was no one within reach of them, and often had to defend themselves against marauders.

I believe in and have insisted on dehorning my cattle even though all the powers of the humane society of the city of Chicago have been brought to bear upon me, and I will say that I lately met the President of the society at Washington and he was compelled to stand up and endorse dehorning as humane.

After getting data together, I found that I had reason to believe that two hundred people annually lost their lives from the lack of dehorning, but I have kept adding to the details from all over the country, and now, how many casualties do you think there were in August this year? Forty-three casualties, one a very valuable stallion and the rest humans. Then you put your cows into the stanchions and going along past the others one will give another a horn thrust just forward of the udder, where, as you remember is the head of the foetus and then you wonder why you lose so many calves. One year I lost twenty-five calves. A thrust like that will certainly kill the foetus, besides the harm it will probably do to the cow.

Now, I want to show you that it is impossible in dehorning to interfere with the brain. The skull of the animal is composed of two bones. It is true that when the horn is broken off there is intense agony, but not so when cut off. Now, in breaking off the horn, this takes place. The two halves of the head are

only bound together, they simply set up against each other, they are separate bones bound at the top with a cross bone which is different from the human. Now, if you take a stick and strike the horn it will spring one-half of the head away from the other. You can't strike the horn without the tendency being to separate the two bones at the suture. It is held on only by the cross-bone and the ligaments that bind it. If you spring it the width of a pen-knife you have made all these little ligaments bleed, you have got blood on the brain, you have even made the brain itself bleed, and a drop of blood on the brain produces congestion of the brain; hence, when struck on the horn I have known the animal to lie down and die.

Cutting the horn is another thing and in the view of preventing damage to the animal it is a kindness to take it off, then they are not subject to the terrible suffering incident to breakage of the horns.

It was the consideration of these things that led me to consider the suggestion of removing them, besides the danger, the horrible casualties added to these. I said, "The horns must go," and 250,000 head of cattle have dropped their horns in the last 60 days through my efforts in the northwest. I say that it is a saving to your dairy cows that run outside, of one quarter. (Of the dairy cows in stanchions I have nothing to say.) If you are feeding cattle it is a saving to you of ten per cent. It is a saving of over two hundred human lives each year. It is a saving of more than half of the shed room. It is a saving of one-half of the manure of the cattle that are running out.

Now, we are told there is a pith in the horn. There is no such thing. The horn is composed of three things; the bone horn, the shell horn, and the periostium. The periostium is a thin membrane in between those two, and in dehorning we simply remove that membrane, but there is also another thing about the make up of the horn, and that is the matrix of the base, and the horn must be cut just at the right place or the animal will perhaps bleed to death. The matrix is right at the base where the shell and the bone horn join, and if you cut it

off at that point there will be little or no bleeding. You will find if you try to do this work with a common saw that you will want a proper tool, such as I have here, and you can get it of the *Dairy World*, and I want to say, that when the mechanics wanted the price put up because it was a new thing I said as the farmer's friend, "No, it will be \$1.00 and no more."

I am very much obliged to you for your attention.

H. H. HAAF.

A DIFFERENT VIEW OF THE DEHORNING QUESTION.

PROF. T. WALLEY, of Edinburg:

The National British Veterinary Association strongly disapproves of the indiscriminate practice of dehorning, and to bring out the argument on both sides of the question we give room to the address of Prof. Walley, before the meeting at which the resolution on the subject was passed. Prof. Walley's address is as follows:

The subject of dehorning cattle has, equally with that of overcharging the udder, attracted a large amount of attention of late years, and this is probably due to the fact that the practice is much extended.

I shall consider it in the same order as that adopted in reference to overstocking.

1. Dehorning is practiced in the vast majority of cases ostensibly for the purpose of enabling feeders to put a larger number of animals together in a limited space than it would otherwise accommodate, and its adoption is said to have been co-extensive with the introduction of court or shed-feeding, and this argument is of much greater weight in some districts than is any argument that can possibly be used in favor of overstocking the udder, but, as I shall show, the exigences of court-feeding do not warrant the infliction of such gross cruelty as is sometimes practiced under the ægis of such an excuse, and all who are conversant with the subject will know that court-

feeding is not an introduction of yesterday. The system has been carried on for generations in many districts of England, Wales, and even Scotland and Ireland, without it having been found necessary to resort to such mutilations as dehorning, and assuming that the wearing of horns is an object of obstruction to court-feeding, the obvious advice would be to breed or purchase only hornless cattle for feeding purposes—though that advice would be difficult to follow if those many good qualities which characterize some of our best breeds are to be retained. While allowing that the practice is not wholly without warrant, I am satisfied that in some instances dehorning is performed for the purpose of palming off upon unwary and ignorant purchasers artificial for natural “polls,” and I am frequently told by salesmen that they can get from 10s. to £1 per head more for cattle that have been dehorned than for those that have not been subjected to the process. Allowing that this is so, it does not prove the necessity of performing the operation, since the supposed benefits to be derived from it can be obtained by painless and more simple methods; but as some of these methods involve the outlay of a little time and money and the adoption of a little trouble, they are discarded by those to whom trouble is a thing to be avoided.

In all properly constructed farm buildings, erected for the purpose of court-feeding, there is provided one or more (there should never be less than two or three) separate courts in which the weakly and the combative members (the “Boxers,” as they are called in Scotland) can be segregated; by this means the former are effectually protected from violence and a sufficient supply of food insured, and the latter are rendered harmless.

In the case of animals that have been reared together, even such precautions as these are not usually necessary, as from calfhood upwards the more vigorous or rather the more pugnacious animals will have secured the mastery, and the more weakly will have learned to submit to a stronger force than that which they themselves can wield; and be it observed here, it is not always the animal with the sharpest or the longest horns

who secures position of "lord and master" in a herd, as it is a matter of common knowledge that the "cush" (as a polled cow is called in the midland counties of England) is the terror of her companions, as although she cannot inflict actual wounds, she can deal severe blows. Allowing that in a lot of recently purchased animals there are one or several individuals of unusually pugnacious proclivities, and that there were no other means available for depriving them of the power of injuring their companions than dehorning, that fact would not justify the indiscriminate adoption of the operation—the punishment, in other words, of the innocent equally with the guilty.

It is the indefensible adoption of the latter course that, in my opinion, renders it necessary that steps should be taken to put a stop to painful and, I maintain, cruel practice.

Dehorning is defended by many people on the plea that it is no more painful than are such operations as castration and docking, but this is, in itself, a bad plea, and need not be discussed in this place further than to say that an entire revolution in the internal management of our flocks and herds would be required if castration were abolished, and that we should not remove both testicles if the excision of one or a part of one would suffice, nor are we in the habit of castrating or docking every animal in a lot because one has proved himself obstreperous and unmanageable, or because another has got us into difficulties.

Another argument used in favor of dehorning is, that animals deprived of their horns thrive more rapidly and command a higher price in the market when fat than do those which have not been so mutilated. Given a number of animals that have been disturbed and worried by one or more restless companions, and the operation of dehorning is practiced, it requires no stretch of the imagination to enable the most ignorant to see that with the cessation of the worrying process and the insuring of quietude, the deposition of fat (growth) will be favored; but again I say the same end can be gained by other and less objectionable methods, and to assert that the mere removal of the

horns from the head of an ox favors the growth of the body is laying down a proposition which is contrary to the teaching of common sense. Had cattle the same extent of horny appendage, proportionally with their size, as a black-faced ram, one could understand that the effectual removal of it would be conducive to bodily development.

The fact that accidents constantly arise to the horns in transit is urged also in support of dehorning, and it is undoubtedly a much more legitimate excuse for the performance of the operation than are others that are frequently offered. Fractured horns bear a very small proportion to the gross number of cattle annually conveyed by rail or sea, and it is monstrous to urge that because one in a thousand (a liberal percentage) has a horn knocked off, the odd one thousand and nine hundred and ninety-nine horns should be removed; moreover, accidents of this nature might be reduced to an insignificant minimum if more care were exercised in the transfer of live cattle.

The operation of dehorning is performed in a variety of ways, and upon animals of different ages. In calves, an incision is in some districts made through the skin covering the young horn "button," and the immature "core" is removed by one dexterous sweep of a curved knife, or by the aid of a pair of curved scissors made sufficiently strong for the purpose. This operation certainly gives rise to pain, but neither the pain nor the subsequent suffering are comparable with that produced by the bodily or even partial removal of the horns of a grown animal. Certainly, in some districts, the pain is aggravated by the use of the actual cautery for the purpose of arresting the hemorrhage, but this is quite unnecessary, as the insertion of a small continuous suture through the lips of the wound will effectually serve the same purpose. In calves of a few months old, the tip of the horn is removed with the saw in an oblique direction from before backwards, the result of this being that as the horn grows it curves in a backward direction, and is rendered harmless as a weapon of offense. After the horn has attained tolerable proportions, as in animals of one year old and upwards, it is re-

moved in whole or in part by the aid of a saw or a pair of strong cutting forceps or shears, and it is just here in reference to the different systems practiced that the question of cruelty mainly arises. No person could reasonably object to the removal of just so much of the free extremity of the horn as would expose the sensitive structure or leave it covered only by a very thin layer of horn, but when a saw is driven violently through the sensitive structures of an organ for the space of from one to two or three inches in diameter the limits of necessity or even of expediency are exceeded, and it is incumbent upon all men endowed with the slightest modicum of human feeling to join in a vigorous protest and an effectual condemnation of such a barbarous proceeding.

It may be argued that after all it is only a matter of degree, and that there is not much difference in reality, so far as pain is concerned, whether you remove one inch from the end of a horn or remove it at its base; as well might one say that if the tip of one's finger were in any way a cause of offense, the whole member should be sacrificed.

In the public mart of Edinburg every degree of dehorning can be seen, but I am happy to be able to say that the number of completely dehorned cattle bears only a small proportion to those in which partial amputation has been practiced, and from very close observation and extended inquiry, I am enabled to assert, without fear of contradiction, that those animals in which the tip of the horn alone has been removed, can hold their own in point of maturity and value (always assuming that they have received equal care and attention) with those less fortunate individuals whose owners or purchasers regard not the sufferings of the brute creation, and who ruthlessly practice the more severe forms of dehorning.

In reference to the districts in which dehorning is practiced, I may say that I never saw the operation performed in England during my residence there, except for surgical purposes, but it has been practiced largely in some parts of Scotland—mainly in some of the northern counties—and in the south of Ireland for a

considerable period, and in some districts has much extended during the last few years.

The effects of dehorning depend entirely upon the extent of the amputation. If the tip only of the horn is removed, the pain produced is insignificant, and in fact is *nil* where the section does not impinge upon the sensitive structures, but the lower down the section extends the greater the suffering manifestly becomes, its intensity increasing with the increase in the diameter of the organ. Granted that the actual proportion of sensitive to non-sensitive structures is comparatively small, the delicate layer of the corium lying between the bone and the horn is probably the most highly sensitive and most vascular of all the tissues of the body.

That pain is produced in the ordinary process of dehorning is shown by the fact that the operator requires to effectually secure his victim in order to carry out his purpose, and by the further fact that the animal frequently bellows and makes violent efforts to release itself from its bonds. The pain is probably less when the operation is performed with a fine-toothed saw than it is when the horn is removed by the shears, and in reference to the use of the latter, I know of one instance in which the operator—a veterinary surgeon I am sorry to say—received severe injuries to his ribs by the handles being driven violently against his side.

That parts of the horns are highly sensitive, especially to concussion, is evidenced by the fact that a smart stroke inflicted on the horn with a stick, or a blow from a stone, causes the injured animal to turn its head to one side and shake it in a melancholy fashion for some time, and in some instances the animal appears to be half stunned (dazed, Scotland) and frequently have operators in Scotland acknowledge this when I have questioned them anent the effects of dehorning.

Hemorrhage always takes place to a greater or less extent, and it is in some instances profuse, so much so that great difficulty is experienced in its arrest. The method of arresting hemorrhage usually adopted is the actual cautery, the use of

which intensifies the suffering, and aggravates, in some instances at least, the subsequent effects. Some operators content themselves, even when the horn is removed at its base, with smearing over the exposed structures a layer of tar, or tar and tow, the result often being that the head of the victim, owing to the coagulation and drying of the masses of gore on the side of the head and face, presents a repulsive appearance.

I have seen cattle sent into the Edinburg market in whom the horns have been removed close to the skull, and the exposed surface cleverly covered over by plastering the surrounding long hair over it by the aid of pitch or some similar material.

SUBSEQUENT AND REMOTE EFFECTS OF THE OPERATION OF DEHORNING.

In those cases where only a small portion of the horn has been removed, the suffering is slight; but even here it will be seen that if the animal accidentally knocks its horn against a hard object, pain is produced; in the course of a few weeks the exposed parts become covered over with a horny material (pseudo-horn), and the sensitive structures are thereby protected from further injury. Where, however, the horn has been ruthlessly amputated close to the skull, the suffering is often extreme, and is always aggravated by cold and wet.

The frontal sinus being open, blood lodges in one of its cavities, undergoes decomposition, and sets up suppuration, the pus pouring out of the cavities in large quantities when the head is depressed or turned to one side, and also escaping in a stream by the nostril. Sometimes the head is carried very stiffly, and is with difficulty lowered for the purpose of grazing; and if the weather is very cold, cattle will often stand with their backs arched, the abdomen tucked up, and the coat erect, and will altogether present a most miserable appearance. Fever, too, more or less marked, is often present.

That there is, during this period, considerable loss of flesh and condition is certain, and although it cannot be said that fatal

results follow the operation in any large percentage of cases, there can be no doubt but that an animal occasionally dies as the result of lock-jaw, and I have sometimes seen nasal catarrh continue for several weeks after the operation.

PREVENTION OF ACCIDENTS.

If this operation is necessary at all—and I do not for a moment admit that it is—it should be performed at as early a period in the animal's life as is practicable; but in the case of animals with well developed horns, I again assert that it is gross cruelty to cut deeply into the sensitive part of the horn—it is sufficient to remove just so much of the extremity of the horn as will leave a thin covering to the core. And animals which evince an extraordinary propensity to viciousness should be deprived of the power of indulging this propensity by segregation.

Another plan for the prevention of goring is the affixing of knobs on the extremities of the horns. The knobs may be of wood, brass, or iron, according to the facility with which they can be obtained; they need not be very large, and should be made of some tolerably hard wood, so as to resist the effects of blows, and also of heat and moisture. Knobs are usually fixed in position by the aid of a nail or screw, which is passed through the knob and the horn from side to side, a preliminary hole being bored by a gimlet or an Archimedean drill. To this practice various objections are urged by those who favor mutilation: 1st, That pain is inflicted in the preliminary drilling. This assertion can only arise from ignorance, for the actual depth of the horn can always be ascertained by noting the difference in sound when the horn is tapped with the handle of a gimlet or a small hammer. 2d, That the affixing of knobs occupies more time than does amputation. This assertion is only partially true, and the facility with which "knobbing" can be practiced depends upon the kind of tools used and the skill of the operator, and even allowing that "knobbing" did take up more time, it

would be a poor argument in defense of cruelty. 3d, That knobs are frequently broken and lost, and a repetition of the operation is rendered necessary and additional expense incurred. From inquiry and observation I am in a position to say that these arguments are of little weight; the percentage of broken or displaced knobs is a very small one, and should not be placed in the balance against mercy; and the cost of a hundred knobs is a mere bagatelle.

If any well-founded objection to the securing of knobs by the aid of nails could be urged, I would say that they can be secured in position without such aid, viz., by boring the hole into which the horn passes in a sloping manner, after the fashion of the leathern ferrule used by some castrators (notably, I think, by Mr. Matthews) for the purpose of securing the free ends of the wooden clam. Additional security could be gained by allowing the knobs (if of wood) to macerate in water for a few hours and driving them on in a wet state, and also by driving in two or three small three-sided iron wedges between the knob and the horn—any portion of horn that may protrude beyond the knob can be removed by the saw.

The President: "The ladies of the Mount Carroll Seminary have sent us an invitation to visit the institution, and the hour appointed is one o'clock."

Convention adjourned to meet at two o'clock P. M. the same day.

AFTERNOON SESSION.

Convention met pursuant to adjournment at two o'clock P. M.

The President: "A gentleman whom I suspect did not get any premium wants me to ask a question. He says he used a separator, and sometimes when he is working his butter after it is salted and after it gets into the tub, he runs his trier in and he finds there is a very little milk in it, and he wants to know how he can remedy it."

Mr. Potter: "If the butter was washed properly I don't see why it should be that way."

The President: "At how high a temperature do you run your milk through the separator?"

Mr. Potter: "About seventy-five to seventy-eight. I think that man will have to look to his butter maker to remedy that trouble."

The President: "Mr. Sharpless knows about the DeLaval separator. Will you answer that question if you can?"

Mr. Sharpless: "I can say, there are lots and lots of butter not that way made with the separator, showing conclusively that the separator has nothing to do with it."

Mr. Monrad: "I am firmly convinced it is not owing to the separator."

The Secretary: "The day is long since past when the separator could be used as the general scapegoat about the creamery. Cooling the cream rapidly to about 40 degrees, as quick as it comes out from the machine, will prevent many of the petty annoyances that some butter makers can still conjure up."

Mr. Bartolet: "I have a question I would like to put. I have ten gallons of sour cream ready for the churn, and ten gallons of perfectly sweet cream, both 58 degrees in temperature. I want to mix them and churn them. How long a time must they be mixed until they are both perfectly ripe for the churning so that the globules will come at the same time, and secure all there is out of it?"

Mr. Boyd: "From eight to ten hours."

The President: "That is on the supposition that you do not change the temperature, is it not? Do you wish to keep the temperature at fifty-eight?"

Mr. Boyd: "No, I don't understand that is proper."

Mr. Hostetter: "I think if he raised the temperature to about sixty-two and let it stand twelve hours it would be better."

Mr. Monard: "I have a pretty sure conviction that by holding it twelve hours it would be too much, and if it was a real case that was put to us I would certainly say churn the can that is ripe, but if the case is put to us to show the difficulties under which creamery men are working by the patrons supplying

them with uneven cream, I will say there is no remedy, but there is prevention. The uniformity of cream has more to do with the quality of butter than most of us think. It don't cost much to keep ice, and if people will build small ice houses it will give the creamery man a chance to make good butter."

REPORT OF COMMITTEES.

The committee appointed to examine the president's address and report upon the same made the following report:

Resolved, In view of the importance and magnitude of the dairy interest in the state of Illinois, it is desirable that every means should be adopted to improve and advance this industry. We, the Illinois Dairymen's Association, request the University of Illinois to devote a fair proportion of any congressional appropriation to dairy experiments, and further request the privilege of sending a representative of the practical dairymen to consult with the authorities of the State University on this subject, and that our board of directors is hereby requested and authorized to appoint such representative.

Resolved, That we recommend the appointment of a commission by the state under the control of the state veterinarian to investigate the cause, cure, or prevention of swine plague.

Said resolutions were adopted.

The special committee on legislation for the purpose of securing arrangements for experiments on dairy points at our agricultural college reported:

Your committee have conferred with the chairman of the farm committee of the board of trustees of the Illinois university and have received from him the assurance that the requests of the dairymen of Illinois will meet with consideration at the hands of the board. If found advisable a request may be made for a chair of dairying at the university, and proper steps taken to secure from our next legislature an appropriation sufficient to meet the salary of a competent man to occupy the position. It is now time to give these matters of dairy work special atten-

tion, and your committee favors the idea of empowering the board of directors of this association to act for the association whenever the proper time and opportunity arrives.

R. LESPINASSE,

JOHN BOYD, Committee.

It was moved that this matter be referred to the board of directors of this association, and said motion was seconded and carried.

The report of the committee on nominations was as follows:

TO THE STATE DAIRYMEN'S ASSOCIATION, IN CONVENTION AT
MT. CARROLL:

Your Committee on Nominations beg leave to report the following names, to be placed in nomination for the office of Directors, for the ensuing year:

Lovejoy Johnson, of Stillman Valley, Ill.

H. B. Gurler, of Dekalb, Ill.

S. K. Bartholomew, of Marengo, Ill.

W. R. Hostetter, of Mt. Carroll, Ill.

D. W. Little, of Preemption, Ill.

E. E. Chester, of Champaign, Ill.

L. M. Potter, of La Fox, Ill.

Respectfully submitted,

W. H. HINTZE, Chairman.

The report was adopted.

The motion was made and carried that the secretary be instructed to cast the ballot of the association for the officers named in said report, and in accordance with that vote the secretary of the association cast the ballot for Directors as follows:

H. B. Gurler.

Lovejoy Johnson.

W. R. Hostetter.

S. K. Bartholomew.

D. W. Little.

E. E. Chester.

L. M. Potter.

And these gentlemen were declared duly elected as Directors of the Illinois State Dairymen's Association for the ensuing year.

The President: "The next thing in order is the discussion of the co-operative creamery business, and John Boyd is on the stand."

Prof. Lazenby: "I would like to ask Mr. Boyd if he would advise those who are following the old system, as it is called, of taking the milk and managing it at the creamery, to give that up and collect the cream? It is being agitated to some extent in our state, and we would like to know what is advisable."

Mr. Boyd: "I hardly think I am competent to pass on a question of that kind. I think that is a matter of business that will determine itself. What is suited for one locality might not be for another. In Ohio I understand your farms are thickly settled, and it is possible that the milk might be taken to the factory and better results obtained from it than there would be from gathering the cream, but in this part of the country, I think not, and in New England it is proving successful. In New England they have never practiced very extensively the practice of carrying milk to the factory; they have in New York state, but not in New England. But in New York state they are adopting this system very extensively. However, I regard that all as a matter of business. If this proves to be the better plan, the old one must go by the board; if the old plan is best, the new one won't succeed. That is the way I look at it.

Mr. Harrison: "What advantages do you see in co-operation over the old plan?"

Mr. Boyd: "Larger cash returns, better satisfaction on the farm; the milk is left on the farm instead of being carried to the factory. It is lost to the farm when it is carried to the factory and in this case it is left on the farm in the very best possible condition to be used."

Mr. Harrison: "Do we understand, then, that you have the

idea that the milk is taken from the farm and left at the factories by the old plan?"

Mr. Boyd: "In some cases."

Mr. Harrison: "Well, where the milk is left on the farm, how then?"

Mr. Boyd: "The returns are far greater by this plan. The quality of the butter is improved, and the quantity is increased; the returns that I showed you pointed to that.

Mr. Monrad: "In those creameries that you refer to as being so successful do the patrons generally use ice for setting their milk?"

Mr. Boyd: "Pretty generally, yes."

Mr. Monrad: "Are not the members of the corporation obliged to keep their milk in good condition or quit delivering?"

Mr. Boyd: "Every member is compelled by the law of the association to handle his milk like the rest, otherwise he is dropped."

Mr. Monrad: "Does not that plan of handling require using ice?"

Mr. Boyd: "Well, that is optional with him. If he uses the ice, he gets better returns, and if he gets a poorer return he is the loser. The ice will increase the amount of cream. By using the ice he gets a larger volume of cream and a greater proportion from the milk than he does without the ice."

Mr. Monrad: "Well, then, would not that be injustice to the man who does not use ice?"

Mr. Boyd: "That injustice is all on his own head, that is the beauty of it; he cannot do any injustice, but he can do himself all the injustice he wants. He will soon find out it is for his own interest to use ice."

Mr. Harrison: "Do you claim that cream raised by the submerged process when the temperature of the water surrounding it is 65, will produce a quality of butter equal to the cream, that is raised with water at a temperature of 48 and 50?"

Mr. Boyd: "We don't use it at a temperature of 65; we don't recommend that for any purpose. There is a difference

between 65 and 45. The temperature at 45 produces the very results; the temperature at 48 produces a good result; the temperature at 50 will produce a good result, but when you get above that you cannot count upon good returns by any system."

Mr. Harrison: "Now, my question was, how would these men be obliged to keep their cream in water at the proper temperature?"

Mr. Boyd: "By the law of the association they are obliged to."

Mr. Sawyer: "Mr. Boyd, this morning in his paper, stated how many spaces of cream were raised on 17 quarts of milk. A farmer very soon learns that by keeping his cream at 45 degrees he obtains the most spaces of cream. If he allows that water to reach 53 degrees he finds out that instead of having 14 spaces on 17 quarts of cream at a temperature of 45 degrees, that he has ten spaces. He will find out that that will always be the result of allowing the temperature to run up, the number of spaces will decrease. Well, just as soon as a man finds that out and he is paid for the space, he is going to do what he can to keep those spaces up, and the only way he can keep those spaces up is to keep the temperature of his water down."

Mr. Boyd: "It not only increases the quantity but improves the quality, so that both the creamery man and the patron are benefited by the operation."

Mr. Tenney: "Did I understand you to say that in all these co-operative factories in New England, they buy by the space, or are some of them on the test plan?"

Mr. Boyd: "All on the same plan. We find this, that where the cream is raised in a uniform temperature the quality of the cream is uniform and the value of the cream is uniform. There is no variation in the actual value of the cream of any account. Of course there will always be a fraction of variation, but there is no practical commercial variation in the value of the cream; that we have proved a thousand times. The great beauty of the whole system is its uniformity; the average is

about the same in one factory that it is in another. If it was possible that the variation exists in that cream that these gentlemen talked about this morning, it would not be possible to show these results. The variation is in the quantity that you get from the milk. Now, I claim this: One hundred quarts of cream from Jersey milk will make just the same number of pounds of butter as 100 quarts of cream from Holstein milk, provided it is raised under the same conditions. But, on the Jersey milk we may have five or six inches of cream, and that is nothing unusual, and on the Holstein milk we may have two inches of cream, (you are lucky if you get that.) I am telling the truth now. I am well aware that there are some Holsteins that have been fed up and have produced big results. I think the Holsteins have their place as valuable cows, but what I tell you is the decision shown by the results from these factories. These figures are valuable for this reason, they are the figures made for a settlement between patrons; there is nothing to hide in them; they are open to everybody. You will find in the Boston papers quoted weekly, the returns from these factories I am speaking about.

Mr. Harrison: "Do you mean to say that an inch of cream from Jersey milk will not make more butter than an inch of cream from Holstein milk?"

Mr. Boyd: "That is exactly what I said, it has been proved by the practical work in the New England factories for the last three years.

Mr. Wilson: "A creamery man from Ohio was out to see me at Elgin the other day and he has been making a series of experiments on this subject for over three months and he says the Jersey cream of the same volume will make more butter than Holstein or ordinary cream."

Mr. Boyd: "The value of the cream all depends upon the temperature of the water it is raised in."

Mr. Wilson: "These were made under the same conditions, water of the same temperature, milk skimmed at the same time, etc."

Mr. Boyd: "I put that against the experience of these factories that have been running over three years; some of them, the sharpest, shrewdest men in the country, men that don't take anything for granted without they can see into it. There are too factories of this same character in that section."

Mr. Tenney: "Do I understand that under this system there is no test made at the factory except in the ordinary churn?"

Mr. Boyd: "There is no test made, they have abandoned the ordinary test."

Mr. Potter: "How to those factories prove that John Brown's cream measuring an inch does not make a pound and a half of butter, and John Smith's does not make three quarters of a pound of butter?"

Mr. Boyd: "They have no means of telling that."

Mr. Potter: "How do we know there is no injustice to somebody?"

Mr. Boyd: "It requires in Connecticut the same number of spaces to make a pound of butter; the same result is shown in Vermont and also in Massachusetts; they are so nearly alike that the variation is of no commercial importance."

Mr. Sawyer: "The point is right here. They are co-operative and individual. If John Brown's cream makes a pound and a half of butter to the inch and John Smith's only makes three quarters of a pound, John Brown knows it or he is going to find it out; it is to his interest to find it out; ten to one John Brown churns his own butter occasionally, the same as any other member that is wide awake and he finds out for himself, and if he finds out that his cream is able to make a pound and a half and he is only getting a pound out of it, he will make an investigation or draw out. No man is going to co-operate as long as he has to pay for somebody else; and as soon as he becomes dissatisfied he pulls out. Now, these creameries have been running on for years and they are still doing so, which seems to be evidence enough that there must be satisfaction."

Mr. Boyd: "There is nothing about the system that forbids using the test; it merely is not an essential part of it. They are

satisfied with it the way it works and that is all I can say about that."

Mr. Monrad. "It seems to me that the real pith of this question is reduced to this. In the west we have got to take better care of our milk; and I say again it is only by using ice that we can get the best results."

Mr. Periam: "Won't you please state why cream raised at a low temperature will do better than cream raised at a high temperature? Is it because the difference between the gravity of the water of the low temperature, and the butter globules is greater than it is when the water is warmer?"

Mr. Boyd: "That is all the secret of it; there is this, however: all the butter globules in the milk are not of one size, they vary in size, some are very minute and they vary from that up to large globules. The globules in Jersey milk are very much larger than they are in Ayrshire milk or Holstein milk, and they come to the surface quicker. These large globules rise in a perpendicular line, the large ones commencing to rise first, and as they come to the surface the little ones come next and are carried up. The rapid cooling forces the large globules quickly to the surface and carries up the very small ones that would otherwise be lost. The first change that takes place in the milk is the thickening of the solids of the milk. When that thickening commences these small globules are too feeble to rise to the surface through the opposition of the thickened milk. Now, these cannot be seen by the naked eye, and you cannot taste nor smell them."

Mr. Periam: "It appears to me that that is the very reason why the experiments made in Ohio as reported by Mr. Wilson between the Holstein and Jersey milk was fatal to the Holstein milk. The gentleman said the conditions were the same, and according to what Mr. Boyd has just said, the size of the globules being different the same conditions would not apply."

Mr. Wilson: "Now, then, the co-operative plan of dairying, as I understand it, is this: Fifty men set their milk under the same conditions, and raise their cream under the same condi-

tions; they skim it, and it is measured and they are given credit for that measure; that cream is all mixed together and taken to the factory and churned, and the number of pounds of butter weighed and the number of spaces that are put into the churn recorded. As I understand it those factories don't know whether one inch of that cream makes a pound of butter or two pounds; they do know that so many spaces make so many pounds and they divide up the product of the butter according to the number of spaces each patron furnishes. Now, I wan't to find out whether they have proven that there was any difference in the quality of cream received?"

Mr. Boyd: "They have tried the experiment time and time again, keeping the cream at home, churning it, and making home butter, and they find it tallies with the creamery report. I do not pretend to say that this is the very acme of what is perfect, I only give it to you for what it is worth, but I do say that where they have tried it, it brings them larger returns than they ever got before and they are all pleased with it, and they are increasing their business very fast. Western butter will find a strong competitor within the next two or three years in these very factories. Heretofore they have not done much winter dairying in New England because feed was so high, but this gives them an incentive; besides that, they are culling out their cows, putting in better cows. This teaches them they must have cream and they are buying better cattle, and the work is going steadily on down there."

GRASSES AND OTHER FORAGE PLANTS.

PROF. W. R. LAZENBY, Ohio Experimental Station, Columbus, Ohio:

Mr. Chairman, Ladies and Gentlemen: I am aware that this subject of grasses will probably not be of absorbing interest to those who are engaged in the manufacture of dairy products, and yet, when we reflect that after all, this is the foundation of

all these products, I think its importance can be clearly apprehended.

I wish at the outset to present a few facts covering this great family of plants called the grasses, and then I shall speak very briefly of a few of the better known and standard varieties which we have tested at the experiment station.

In the first place, as you are doubtless aware, plants of the vegetable kingdom are all grouped together into classes or families, very much the same as the animal kingdom is. In the animal kingdom we have got the horse, swine, sheep and so on; so in the plant world we have families of plants in the same way, with numerous varieties in each family.

For instance, one large family is called the rose family, there is the sun flower family, and then we have this most important of all families, the grass family. Why do I say it is the most important? Well, simply because it is the family that furnishes a larger part of the food of our animals and ourselves than all other families together. I suppose if we had to choose between this one family of plants and all other plants that grow on the earth's surface, however much we would dislike to give up the many valuable products that come from the various families, we would have to select the grass family. In the Bible it is said that "all flesh is grass." That probably is a figurative expression, but it is a literal and scientific truth because all flesh *is* grass. Just think what makes the flesh and the different products that come from our stock, such as milk, butter, cheese, etc. It is simply grass and the products of the grass family.

There are a few simple facts concerning this family that I think cannot fail to be of interest. In the first place we have thirty-five hundred different species belonging to this family of plants. There is no class of plants so widely distributed as the grass family; and not only are they widely distributed, but the same species and varieties are very widely scattered. Of these thirty-five hundred species we have about three hundred and fifty growing in the United States, and in the different northern states the number of varieties is about one hundred and twenty

o one hundred and forty. In the state of Ohio we have collected one hundred and twenty-five different species of grasses found growing in greater or less abundance.

What are some of the peculiarities of the plants of this family? One of the most important is its *social habit*, and this is one of the things that makes it so valuable as a forage plant. There is no plant that has the same social, aggressive habit. The grasses will grow better apparently when they are crowded somewhat together, than they will when they are scattered. In our experimental work, that is one point that has been made very clear. In testing many different varieties we have found this to be the fact, that you can mix a variety of grass seed and that each one of several varieties that might be named will give just as large a product when they are grown together, as each one would if grown on the same area separately. That is on account of the social habit of the plant. It seems to thrive better in company, and that explains why we have the beautiful lawns and well sodded meadows and pastures that we have.

Another interesting thing: We have one other family of plants that is somewhat closely allied to the grasses and is often mistaken for them and those are known as sedges, and I want to tell you how you can very easily distinguish a grass from a sedge.

The main characteristics of all the members of the grass family are these: In the first place the stems of the plants are either hollow or pithy. You never saw a grass that had what we call a solid stem. They are either hollow like straws, or like corn stalks, they have a distinct pith. That is one of the characteristics. Then, when you take a section of the stem of any one of the grass family, you will find that it is circular, you can roll it between the thumb and finger. With one or two exceptions this is a characteristic with every one of the species of the family. Also you will find the stem divided by what we call joints, or nodes. These are simply circular partitions extending through the stem, where it is hollow and giving it strength. You will find the greatest number of these nodes or joints

toward the lower part of the stem where strength is needed, and as you go up the stem the distance between them is increased.

If you notice the leaves of the grass you will always find that they come out from these joints or nodes, and they are what is termed in botanical language, *opposite*. That is, a leaf starts on one side of the stem and the next starts from the joint above and then you go to the next one and you will notice that that starts directly above where the first started.

Another thing, the leaf of the grass always surrounds the stem to a greater or less extent. It frequently surrounds the stem until you get to the next node above and sometimes it extends even a little higher than that.

These characteristics will enable you to distinguish any member of the grass family from any member of the sedge family. If you will make a cross section of the stem of the sedge you will find it is almost always triangular, and you will find that the stem is solid, not pithy and not hollow. When you come to the leaf you will find that the leaves are not two ranked but three ranked. That is, the stem being triangular there are three leaves each coming from a different angle of the stem. In these different ways you can easily distinguish between any member of the sedge family and any member of the grass family.

During the past year at our experiment station we have had many specimens of sedges sent for name and history. Farmers throughout the state have seen these growing upon their farms and have wanted to know what they were and if they were of any value. They have no feeding value and are of no economic importance.

I will now very briefly speak of a few of the best known of our grasses, those that we have been cultivating for a number of years under essentially the same conditions, and trying to study their comparative merits with some degree of care.

In the first place I will take the one that is best known probably of all, and that is timothy.

I suppose that timothy is more largely cultivated than any of the true grasses. There are many things that can be said in its favor, and yet it has some weak points. The things that stand specially in its favor are these: In the first place it is a grass that when you want to sow it you can get *pure, clean seed*. You know exactly what you have and that is a great deal to begin with. Timothy seed is also cheap. There are very few of the grasses that give this clean seed. The seed is usually surrounded by closely adherent chaff, and this chaff cannot be easily separated from it, so you don't know whether your seeds are good or not. The chaff makes it very bulky and you get comparatively few seeds in a given bulk and then you can't tell whether your seeds are of good or bad quality. That is one reason why there are so many failures in sowing grass seeds. There is another advantage in timothy. It is one of those grasses that does not deteriorate very rapidly after it has ripened, and you can leave it for a considerable length of time after it has blossomed and the seed is matured, and it will be comparatively good. Another advantage is that it has comparatively few leaves. That is not an advantage as a forage plant, but it is an advantage for transportation. It does not waste so much by handling as many other varieties of hay.

Now, these are some of the principal advantages. Of course, you all know what the disadvantages of timothy are. In the first place we find in comparison with other grasses, speaking simply for our own state, that we never have secured as great a weight as we have in other grasses. That is, weighing the whole product that comes from a given area of ground. In the second place, the quality is not as good for many kinds of stock. If you want to feed a team that you are driving constantly upon the road and that you simply wish to keep in good muscular condition, or are feeding stock where you don't look for an increase of weight, or flow of milk or anything of that kind, the timothy may be one of the very best kind you can use, but certainly it is not one that ranks high in what we call nutritive

qualities, qualites that will make themselves seen immediately in the milk pail or immediately in the way of putting on flesh.

Then there is another great disadvantage, and that is if timothy is cut very close it is more likely to be injured than many other grasses. Our timothy is often quite severely hurt by the winter. We have cut it at different heights just to see how it would stand the winter, and I think you all know that the bulbous character of the lower part of the stem is destroyed by very close seeding; if the plants are not killed outright they are very much weakened, and you don't get a healthy growth afterwards. Dispite these drawbacks, there are many farmers who will stick to timothy and think it is the best grass they can use, and perhaps they are right.

But here is a grass that certainly ranks very much higher on the scale of points we have used, *orchard grass*. We have raised this for five years in an experimental way and tested it side by side with timothy, rye grass, red-top and quite a number of other varieties, and I can say from our observation and experiments, that this is one of the most valuable grasses. It springs up more quickly, it can be cut earlier, makes an earlier bite for pasture than any other that we have tried, with the possible exception of the meadow fox tail which is also a very early grass. The orchard grass stands our winters perfectly well, and there seems to be little tendency for it to run out. We have a piece six or seven years old which is just as good to-day as when first established, and I have known of several fields of orchard grass that are over twenty years old, in New York State, that are now in very good condition. Then, another thing is that it has a much larger leaf development. One objection, perhaps, to the orchard grass would be that it grows in bunches or tufts; then another objection is that it loses in value very rapidly after it has reached the right stage of maturity for cutting. We have tested this quite carefully by making analyses at different stages, and it changes much more rapidly than other grasses. In our state this is one of the best grasses that we have. The seed of the orchard grass is very light; it weighs

about fourteen pounds to the bushel and is always surrounded by chaff. There is a great deal in the markets that is not good; the seed is very imperfect, and if you fail in making a stand with orchard grass, it is very likely that the failure may be because of the seed that you secure. We sow at the rate of two bushels per acre. I think it is better to sow in the spring. We sow about two bushels of the orchard grass to the acre with about eight or ten pounds of clover. Clover and orchard grass, especially what we call our mammoth clover, make a very good hay if it is watched and cut at the right time. If allowed to stand a little too long the orchard grass deteriorates.

Another grass that we think very highly of, and one which in many respects stands among our best grasses is the *rye grass*. It has been cultivated for a long time in England, and is one of the most valuable species that is raised there. It has been separated into many different varieties from having been cultivated so long, as all of our cultivated plants do. We have therefore a great many kinds of rye grass, "*Dixon's*" rye grass, "*Pacey's*" rye grass, and quite a large number of others which are simply varieties of the one species of grass. This grass has many good qualities. It grows readily from seed, and it has a comparatively large seed. It is because the seed is something like rye that it is called "*Rye*" grass. You know very well that the vigor with which a plant starts, depends very much upon the size of the seed. This grass seems to be especially adapted for pastures and makes also good hay. It stands high in nutritive value and the stock seem to relish it very much. I may say the same for orchard grass.

Although called a perennial, it will not live more than two or three years, as a rule, unless there is a good deal of it goes to seed. We sow about two bushels of seed to the acre. The spring sowing, I think, is better adapted for this, and probably this is especially true in a grass that approaches an annual. Spring seeding is a little better for most annual plants, and in fact, other things being equal, it does seem to me that the spring is the best time to sow seed of any kind. The same holds true of

transplanting. In the spring the soil is smoking with fermentation; chemical changes are taking place very rapidly at that time and those changes are very favorable for the growth of young plants. There are some who must do all they can in the fall and might better attend to seeding at this time than wait until spring and then do the work poorly. One of the difficulties of our climate is we have no spring worth mentioning. We have long winters, long summers, and fine autumns, but no spring to speak of, and of course if we can save a day in the spring by doing the work in the fall we are glad to do it.

I think that the red top is perhaps too well known for me to dwell upon. We like that very much upon our rather moist river bottom ground. It makes a very large yield of hay, very much more than timothy, weight for weight, about the same as orchard grass. Orchard grass grows up more quickly after it is cut, and I don't know of any of our grasses that yield a heavier aftermath than does the orchard grass. I would never recommend that orchard grass be sown upon poor ground. Our ground is in a good state of cultivation and unless your ground is in good condition it is hardly worth while to sow orchard grass.

I would not advise anyone who has not used these grasses, *orchard grass*, or the *tall oat grass* or rye grass, or a few others that I might mention, to go out and buy large quantities of seed and sow them on a large scale, but I would advise them to test them carefully on a small piece of land, watch the results very patiently, and if these varieties don't do better than those you now have upon your farm, why just drop them. If they do better, and I am inclined to think you will find that many of them will do better, why, then give them a larger trial.

It seems strange to me that when so much depends upon the value of our grasses that so little attention is paid to the selection of varieties. When you go to a horticultural meeting why nearly all that you hear is the question of varieties, and the greatest nicety of opinion and judgment is brought into question to discriminate between the varieties of strawberries or rasp-

berries, and a new variety is greeted with the greatest interest. Now, with dairymen, grass is the most important question that can come up for discussion, and yet how little discussion we hear about the variety of grasses in this country. It is not so, I believe, in England. More attention is paid there to the subject.

Of course there are many more varieties of valuable grasses than I have mentioned. I have told you something about a few and I would most earnestly recommend that you try some of these newer species, and I think that you will be pleased with the results of the trial.

Mr. Boyd: "Would you sow rye grass with winter grain?"

Prof. Lazenby: "I don't believe very much in trying to raise two crops at the same time, although I know it is a very common practice. Under some circumstances it might be advisable, but as a general rule I prefer giving the ground one crop at a time. Some of you may have a little experience in laying down lawns, and perhaps you have used fancy varieties of mixed seeds secured from seedsmen. I don't think there is much in this fancy seed. I have always held to the opinion that if you have got grasses that make a good meadow, they will make a good lawn when properly handled. If you have ever done anything in the way of establishing a lawn, you know that if you have your ground carefully prepared the fall before and then sow the seed early, it is not very long before you have a nice sward. We have laid down a great deal of lawn on our university grounds and have had no difficulty at all in making a selection among our more common grasses, June grass, red top and some of this rye grass and a little timothy, adding perhaps a little white clover and you will have a fine lawn in just a few months. You don't need to sod. Have your ground well prepared, make a judicious selection of seed and you will have no trouble."

Mr. Boyd: "You would not recommend orchard grass for a lawn?"

Prof. Lazenby: "Oh, no sir, not by any means. We have been criticised for recommending timothy, but I say that a little timothy put in with the other seeds is a very great advantage, because it starts quickly and it seems to act as a shade for some of the slower growing varieties, and if you keep your lawn cut the timothy will never trouble you. We get a fine looking lawn earlier by using timothy, and the other grasses seem to be helped by it. Of course the chief requisite of a lawn grass is the ability to produce its leaves rapidly. The leaf grows not at the tip, but at the bottom of the leaf; of course this growth keeps pushing the leaf forward and the end keeps advancing, but the growth is really at the base. We want grass whose leaves will grow readily and timothy is not one of those, that is it does not fulfill that requisite as do many of the other varieties.

I want to speak now of one or two of our grasses that are very largely cultivated in some places of the south. Here is one, the Johnson grass, a species of sorghum. It is a grass that is being very widely cultivated in the southern states, and it is quite highly recommended by some of our writers and experimenters in states pretty well north. It grows remarkably well, and we have cut a larger weight from a given area from this seed than of the grasses I have mentioned, but our cattle, sheep and horses, don't seem to pass a very favorable judgment upon it. Unless it is cut when it is quite green I think it will not make a very good hay grass and while we have had no experience with it as a pasture grass, I question whether grass as large as this will make a very successful pasture. It is injured to a considerable extent by the winter.

Question—"Would you advise a mixture of orchard grass for pasture where we have rotation of crops and the pasture lasts two or three years?"

Prof. Lazenby: "Yes; I think for that purpose orchard grass does well, but it does better where you expect to let the ground lay a little longer. Our experience has been that we get the largest crop the fifth and sixth year after seeding in orchard grass. I know some of our best farmers think well of orchard

grass, not for permanent meadows but in rotation. The best time to cut it is just about the time to cut clover, and that is not true with timothy. You cannot cut clover and timothy at the same time and have them both in the best condition. Then the stems and leaves of the orchard grass keep up the clover, so it prevents trouble where there is a tendency for the clover to lodge. I think orchard grass holds it up a little better than timothy."

Here is a grass that we have been cultivating for some little time. It is the Dhoura, or the Chinese sugar cane. It was recommended as a forage plant and sent out by the United States Department of Agriculture, but with us I think it is hardly worth any further consideration. It is simply no better, not so good, as our ordinary corn-fodder. I had a great deal rather have our sowed sweet corn than this, and we have tried to give it a fair trial.

We have tried a great many other grasses of various kinds, some of them having very long and difficult names, and some being very highly recommended, but we have found nothing either for soiling, or for the silo, or for winter pasture as good as some of these better known and more generally grown grasses.

We have this oat grass, called tall-oat grass, and we have noticed good results from its use in Kansas, and many other parts of the country. It is a soft grass, makes excellent hay, seems to be perfectly hardy and yields a large growth. The stock seem to be very fond of it. It is a very promising grass.

Mr. Boyd: "Do you consider that as valuable as orchard grass?"

Prof. Lazenby: "Well, sir, if I had to choose between them, speaking for our own locality, I should not, I should take the orchard grass. It may be I am slightly prejudiced in favor of the orchard grass, but with us it does admirably.

We like the German millet very well. We never have succeeded well with the Hungarian grass or common millet. We cannot get what we regard a very large crop from it. We do

get good results from the German or golden millet. It makes fine fodder. There is a great deal of nutrition in the seeds and some of our farmers are threshing it out, and grinding the seed, but I wouldn't want to say whether that was profitable or not. I should rather cut it a little earlier and let the stock eat the seed on the plant. If cut early the seed is not injurious to horses.

Question—"You didn't say how much of the seed of the tall oat grass you would put to the acre?"

Prof. Lazenby: "I think it is about two pounds lighter per bushel than the orchard grass and contains less seed. About three bushels is the rate we use it. The orchard grass, the June grass, red-top and this oat grass, weigh about the same per measured bushel, and where we know the seed to be good we use just about the same quantity, about two bushels per acre. When we add clover we sow about the same quantity. One and one-half bushels of rye grass is sufficient for an acre."

Mr. Boyd: "I have found it necessary to put in three bushels of orchard grass."

Prof. Lazenby: "That would depend altogether on the quality of your seed. We test our seed always beforehand. We found it a matter of some difficulty, but by separating it, counting out one or two hundred and putting them in our seed tester, we would get an idea of how many seeds we had and the number of seeds in a small weight is surprising. I had one of the students make a little estimate of the number of seeds there was in a bushel of this red-top. We had a little cup made very carefully that was of exact dimensions; we knew it was a fraction of a given bulk. We counted all the seeds that it would take to fill that, and we found that there are four hundred and fifty thousand seeds in one ounce of this grass.

Now, in conclusion, I would simply say this: I hope that every dairyman here will arrange next spring to make, not an *extensive*, not an *expensive* experiment with these grasses, but try some of our newer varieties. You can afford to do that surely when our horticulturalists are testing so many things just

to find out which are the best to raise on their land. One man will often try twenty varieties of raspberries and as many strawberries, and he keeps right at it. Now, you can try some of these newer grasses and see what the results will be, and if they don't give good results don't be too swift to enter up judgment and condemn them, but try once more, and if after the second trial the results are still *nil* you can reasonably conclude that for your soil and climate you don't want those varieties. But remember this, that under other conditions they may still be the very best grasses that can be selected. Because a grass does not do well with us we cannot decide that it won't do well somewhere else."

Mr. Boyd: "About Alsike clover?"

Prof. Lazenby: "We never have done much with Alsike, and do not consider we have given it a fair trial. We have tried the Lucerne, and with us it is not profitable. It is too coarse, the stock don't seem to be very fond of it. If you cut it for hay it is difficult to cure. It is hardy, it springs up year after year. In fact, we could hardly get rid of it, but it does not yield with us anything like the quantity that we had been led to expect."

Question—"Did it winter-kill with you?"

Prof. Lazenby: "No sir, it did not, it stood very well. As I understand, this Lucerne is the same thing as the Alfafa of the Rocky Mountain Slope, and perhaps I should say that we planted it in a sheltered place and that may be the reason it didn't winter-kill."

Question—"Did you sow it broadcast?"

Prof. Lazenby: "Sowed it broadcast."

Question—"How is orchard grass in dry weather?"

Prof. Lazenby: "First rate with us. During the past summer it has been very dry at Columbus. From the 10th of June till the 10th of November, five and a half months, we had but six and a quarter inches of rain-fall, and that is a little less than one-sixth of our average rain-fall for a year, but in spite of this the orchard grass did well. It looked quite green when the other grasses around were brown and sere."

DISCUSSION.

Mr. Hayes: "I have had quite a little experience with grasses in Iowa in about this latitude, and I want to say a little about orchard grass, tall oat or meadow grass and the rye grass. The question with those three grasses is, can we afford to pay the high prices for the seed that we must pay for them in preference to timothy, red clover and our commoner grasses. I firmly believe that we cannot do it. Mr. Boyd said at Manchester he found it necessary to sow three bushels of seed to the acre. We will suppose, for instance, that he wishes them in rotation, he must pay at least \$1.50, probably \$2.00 per bushel for his seed and that makes \$6.00 for the seed, and if he sows some clover there will be a little additional expense. Now, we all know that a mixture of timothy and red clover costs very little for seed and the same with blue grass. If we want permanent pastures blue grass should be sowed and we should sow with it some timothy and some clover, to protect it for the first year or two until the blue grass gets a start. It takes at least three years to get hold of the soil; it spreads entirely by underground root stalks. The branches of all these grasses come out at the joints underneath the midway of the leaf. If you sow your blue grass and clover for the permanent pasture about the time your blue grass is started the clover is liable to kill out, owing to the condition of the climate and so on. As to the orchard and tall oat grass, if we could get the seed cheaply and could get a stand readily, which we cannot do, we could produce probably slightly better crops than with timothy, but the cost of the seed is too great. The farmers look the whole thing over and think that that is the thing they would like to do, but when they go to buy the seed they are stumped. It might pay to sow oat grass with blue grass; if sowed in the spring it comes up very quickly and will make a good deal of pasture, probably more the first year than red clover. The greatest question of the grasses is how to mix them, when to sow them, how to form our pastures with a few of the best grasses? We do need to

make more experiments, but I honestly advise that you don't put much money in these other grasses until you do experiment with them. If you only plant a piece two rods square you can see the habit of the plant and learn a good deal about it."

Mr. Boyd: "I put in ten acres of orchard grass ten years ago, and that field is good to-day. I put in two bushels to the acre and I think it would have been a little better if I had put a little more. This last year I put in ten acres more, sowing three bushels, and that is very satisfactory. It cost one dollar and ninety cents a bushel. If I had put in two bushels of blue grass it would have cost one dollar and a quarter a bushel and I would have saved the difference between one dollar and twenty-five cents and one dollar ninety and the one extra bushel. Now, the point of that all is, that I can produce as much from my ten acres of orchard grass as I could from twenty acres of blue grass."

Mr. Stickler: "I sowed some orchard grass thirty years ago. I put it in a fence corner where I had a new clearing. It came up there and it is there yet; I paid three dollars a bushel for the seed to try it, and I got bushels of seed off of that in a short time. Every farmer can raise his seed in this country."

Mr. Boyd: "I am specially in favor of orchard grass for dairy cattle. It is worth twice as much as timothy for dairy cattle, and from seven acres of the field where I sowed two bushels to the acre I cut thirty-six two-horse loads of hay one season. I cut it twice every season. The yield this year was not very good, and 1885 there was rather a poor crop, but it was far better than any crop of timothy in the neighborhood, and it is almost twice as much as you raise of the timothy."

Mr. Hayes: "Do you consider it as valuable for pasture as you do for hay?"

Mr. Boyd: "I do, but I do not believe in a pasture of one grass. I believe in a mixture of grasses, I believe in permanent pasture, and I would have every different kind of grass that grows."

Mr. Periam: "I will add my testimony to the value of

orchard grass. It comes very early in the spring and it stays by us. Now, about these new varieties of grass seed: Of course they are high, but that is because there is very little call for them, and those who keep them in stock must sell them for more money. If there was more call for them, there would soon be plenty in the market at lower figures."

Mr. Chester: "It does not take much seed to seed a little ground and any farmer can soon have seed to put upon the market. Now, about orchard grass, I want to say to the dairymen of Illinois that you need not open your silo in the hot dry months if you have plenty of orchard grass; the time never came in central Illinois during the driest of all seasons in which orchard grass did not make at least something of a growth; I have never seen the time when red clover will start at all, that orchard will not grow right along, and I have found no time in the driest weather, after my orchard grass pasture has been eaten down closely, that in ten days time I have not a good bite again, and that has been the rule all through the ten years I have had the orchard grass. There are some things that I do not agree with our Professor from Ohio about. For instance, he recommended that grass seed should be sown in the spring. When I was in Ohio we did sow in the spring and we thought we did better, but in central Illinois, by all means you should sow timothy seed within one hour of the time that you sow your fall grain, put it on the ground on top with the grain and the first rain will cover it. Now, I am going to tell you something that may astonish you. There is a prospect that in these dry seasons we shall have another siege of chintz bug, and I want to assure you that if you get a good crop of timothy started with your wheat in the fall, you need have little fear of ravages upon the wheat crop from the chintz bugs. Another reason why I believe in sowing the grasses with the wheat is that if I sow the grain by itself it is almost impossible to keep down the rapid growth of weeds."

Mr. Boyd: "How much seed do you sow to the acre?"

Mr. Chester: "About half a bushel."

Mr. Boyd: "In a native pasture you will find seven distinct plants to the square inch. Now, I will tell you the trouble with your sowing, if you will occupy the land with good seed you will not have any weeds."

Mr. Periam: "Two hundred and forty distinct plants have been found in England to the square foot."

Mr. Grossman: "Mr. Boyd, will the orchard grass sown in the fall keep the weeds down during the next season?"

Mr. Boyd: "Sure as you live, you won't find any weeds in that deal. You won't get a first-class crop the first year, but you will get a crop."

MILK FEVER IN COWS.

BY DONALD MCINTOSH, D. V. S., Professor of Veterinary Science, in the University of Illinois:

Mr. President and Gentlemen of the Association: Last spring I published a short article on the above subject. Since that time I have received a number of letters from different parties who had occasion to use my prescription, thanking me for publishing so effective a remedy. Their cows, said they, had all the symptoms described as peculiar to this malady; they gave the medicine as directed and their animals got well. This, therefore, has prompted me to send you this short paper on the same subject, believing some of you may not have seen the former article, and also that I might be able to impress upon your minds the great value of this remedy to the dairyman and those keeping good cows.

This is a disease peculiar to the cow. Gamgee and others who have written on this subject are of the opinion that there is present in the blood a specific element. Some attribute the disease to accumulations of milk—producing elements in the blood, giving rise to fever, and practically, blood poisoning—the sudden overloading of the system with blood, causing nervous disorder. Again, another says that at the period of parturition, when the act is rapidly accomplished, a large excess of blood is thrown

upon the system. The effect is the same as when a flux of some standing is suddenly checked; either some of the excretory organs exert their power of vicarious actions, or a sudden increase in blood pressure takes place. This is the view that is usually taken, but I think it a wrong one, as in every cow, at the time of parturition, there is this excess of blood thrown back upon the system; but nature has provided for this. It is quite another thing in the case of the flux, that was checked by administering powerful astringents, which is acting contrary to nature.

Still another thinks that it is such a derangement of the sympathetic nervous system as seldom to admit of recovery—until (finally) apoplectic lesions result. The first part of the above, I think, is nearest to the point, but the latter part is the stumbling block over which nearly all fall—that is in believing the nervous derangement causes apoplexy.

When I commenced practice, some eighteen years ago, I followed the teaching I have just mentioned, and my milk fever patients nearly all died. This state of affairs provoked me very much. I made a number of *post-mortem* examinations of the animals that had died of the disease, and failed to find the apoplectic lesion described. Of course, I found redness and some fullness of the blood vessels, but no more than one would find in making a *post-mortem* examination of animals dying of (other) diseases not apoplectic.

I concluded from this that the disease was not congestion of the brain and spinal cord. I then took up the nervous theory and was supported by the following facts: First. The cows which became affected with this malady are nearly all very fat and flabby, while in some few cases the animals are very thin and weak. Such animals are barely able to cope with the violent strain and nervous exhaustion which takes place at this period. Second. The season of the year most fruitful to this disease is in the warm, enervating weather of the spring and early summer, when the grasses are soft and succulent, which increases the flabby condition of the already too soft animals.

Taking these facts into consideration, I changed the treat-

ment from bleeding, sedatives, violent purging, and applying ice to the head, etc., as directed by most veterinary writers, (I do give purgatives still, but merely to assist in moving the bowels when the animal gets over the attack) to powerful stimulants from the earliest stage of the disease, or whatever time I may first see the animal, and the disease has not been too far advanced, and now I never lose a case of this so-called very fatal disease.

I believe this new method of treatment will be the means of saving the lives of thousands of valuable cows, and thousands of dollars to the dairyman. I will now proceed to give the symptoms, treatment and prevention of this disease.

SYMPTOMS:

The symptoms of this disease are characteristic. In the early stage (which is generally a few hours after calving) the animal will be noticed shifting its weight from one hind leg to the other. This she does continually, and if made to move will show weakness in the hind quarters and if forced to walk will fall, but may be able to regain her feet with difficulty. In a short time the animal falls and is then unable to resume the standing position. There is some constitutional disturbance, and after being in this state for some time the breathing becomes accelerated and the pulse quickened. As the disease advances the brain becomes affected, which is evinced by the animal tossing her head in a violent manner. At other times the animal presses its head against the shoulder or side, and if an attempt be made to draw the head forward it will, as soon as released, fall suddenly back into its former position, the neck presenting a peculiarly stiff appearance, not observed in any other disease. The eyes very soon become insensible to light, presenting a glassy appearance and if touched with the finger or other object every sign of sensation will be absent. In some cases the power of swallowing is lost. At this stage the animal, if not promptly attended to, soon dies. This is generally the case when treated as directed by most veterinary writers. By the method of treatment which

I have followed for the last few years I do not lose a case when seen in time.

TREATMENT:

Aromatic ammonia..... 10 ozs.

Spirits of nitrous ether..... 20 “

This is enough for ten doses; 3 ounces to be given every half hour till five doses are given; then 1 ounce every hour till the balance is administered. Each dose to be given in half a pint of cold water.

This may look like a large quantity to be given, but this is what is necessary to stimulate the nerves into action.

I also give from 1 to 1½ pounds of epsom salts, with 1 ounce ginger, the whole to be dissolved in half a gallon water and given at one dose. Also mix a half pound of good mustard with warm water, rub this over the loins and cover up with a rug. This I do to assist in stimulating the spinal cord. After doing this the animal generally lies quiet for about eight or ten hours, when she will get up. In this case no after treatment is required. In some cases the animal becomes lively and commences eating, but remains unable to get upon her hind legs. It is then necessary to give nux vomica in dram doses three times daily, for a week, in gruel.

PREVENTION:

The best prevention in this disease is to keep the cow in a good, firm, healthy state, and not to have her too soft and flabby. This can be done by giving the animal good solid food and not too much of it. In the spring, when the weather is getting hot and the grass long and succulent, keep the cow off such pasture and put her in a place where she cannot get much grass, and have a stable for her and feed dry, solid food, as hay, oats or corn. Soft, sloppy diet is not good. If the animal is fat it would be well to give her 1½ pounds of epsom salts about ten days before calving. It is not wise to give it at or a few hours before calving, as it weakens the animal. This treatment I have advised for several years, I think with beneficial effects as par-

ties who used to lose cows have, since they adopted this plan, not been troubled with milk fever.

If the udder is full and hard I would milk the cow before calving in all cases, as it prevents garget and does the cow no harm afterwards.

COLD PACK TREATMENT OF MILK FEVER.

E. A. A. GRANGE, Professor Veterinary Science Agricultural College of Michigan:

(The request for information upon the diaphoretic form of treatment in this dread disease led us to secure the report of Dr. E. A. A. Grange, who has been uniformly successful with this system and has lately stated he had no reason to modify his opinion expressed at length in bulletin form over two years since.) Says the Professor:

"I have obtained some very favorable results from the application of *cold, wet packing*, in the treatment of parturient apoplexy, or milk fever. Unfortunately the number of animals that are invaded by it, is on the increase from year to year, in direct ratio with the improvement in milch cattle. It is very important that it should be detected as soon as it makes its appearance, for I do not know of any disease where the old adage of a 'Stich in time, etc.,' can be more appropriately applied, than to the one under consideration, and the remedy which I shall further on allude to, has in those instances that I have applied it, 'nipped the disease in the bud.'

SYMPTOMS.

"In those cases which I have had an opportunity of observing in the early stage, the first evidence of something being wrong was an exhibition of general restlessness, and loss of appetite, accompanied in many instances by rigors, or in other words a chill; which is often more or less confined to the hind quarters; this is usually followed by what is called by veterinarians paddling of the hind feet, which consists in an uneasy movement

of them, during which they are lifted, first one, then the other, from the ground, and put down again, not exactly with a kick, but rather a paddling like motion. At this stage there is usually a profuse discharge of tears from the eyes, the countenance is one of anxiety and distress, when singularly enough, the mother seems to lose all interest in her offspring, and will not notice it. If the affected animal is required to walk, it will do so with a staggering gait, or will even drop behind, and fall down.

"The secretion of milk is much diminished, or perhaps stopped altogether. The above may be considered as the symptoms of the first stage, to be followed, however, in somewhat rapid succession by those of

THE SECOND STAGE,

In which paralysis, and impairment of those organs which control consciousness are most noticeable. The unfortunate animal will lie or fall down, and is often unable to rise, although it may make frequent attempts to do so, but eventually gives up, completely discouraged. At this point the head will be flung around to the right side and kept there persistently. The muscles upon the side of the neck become firmly contracted; even when the head is brought, by force, into its natural position a sort of kink will appear in the side of the neck towards which the head is thrown, and which I have seen remain for some days after the animal was able to walk about. In other instances I have seen cases where the animals would rest their heads upon their horns, thrown back against the floor. In these cases care must be taken by the attendant to prevent the animals from breaking off the flints, or horn cores, by the force they occasionally use in flinging their heads about.

IN THE THIRD STAGE

The animal drops into a profound sleep, when it will lie almost motionless, breathing it may be, with a loud, snoring sound, the cheeks becoming inflated at every expiration, things go from bad to worse until death eventually closes the scene. Once in a while, though, one will meet with a case where this profound

sleep appears to do the animal a great deal of good, for it will awaken, to make a rapid recovery.

"The foregoing manifestations, together with others, not perhaps so perceptible, will be observed to a greater or less extent in every pure case of this disease.

TREATMENT.

"Before describing the manner of applying the *pack* I would like to say a few words as to how I came to adopt this form of treatment. In short, some time ago I was called upon to visit a cow attacked with some unknown disease (unknown to the owner.) I was not long in determining that I had a case of parturient appoplexy to deal with, but in passing my hand over the animal's body, during my examination, I observed it to be bedewed with moisture, which I thought was water, it being a wet day, and asked the owner how he came to leave so sick a cow out in the rain; to which he replied that "she had not been out in the rain, but had been in the stable where I was then examining her, since she was first taken." I must admit I was somewhat astonished, but a closer examination revealed that the moisture was *sweat* from the *skin*, and not rain-water. This most unusual occurrence caused me to reflect before proceeding with my usual treatment, but soon concluded that nature was doing all she could to throw off, as it were, the disease, and did not feel disposed to interfere, with any of my own medications, but rather tried to help nature in her effort, by placing plenty of dry straw around the cow, and a light, warm blanket over her, and after attending to some of her more immediate wants, it being late at night, I left her, not before, however, telling the owner to come for me if she showed any evidence of not progressing favorably, and explained to him why I did not there and then give the cow some medicine. The next morning she was much better, and in the afternoon was able to walk about, although paralyzed and unable to rise the night before. With careful feeding she made an excellent recovery. This case and others have made a very strong impression on me

that the diaphoretic (a remedy which causes a discharge of perspiration from the skin) form of treatment is the sheet anchor in this disease, but the difficulty was to get one, whose virtues were not more than counterbalanced by other circumstances. I have often longed to try the Turkish bath, in these cases; unfortunately, this kind of diaphoretic, is not one that can be carried about conveniently, so that it becomes impracticable. I have tried the hot blanket with variable success. The difficulty with them is the trouble of applying them properly, and it is hard to get attendants to make the changes at the proper times, or to do so in such a way as to prevent the animal from getting a chill; then the hot water is often inconvenient, the boiler perhaps being some distance from the stable, with many minor difficulties, perhaps too numerous to mention. The cold wet pack has from time to time been brought under my notice, and eventually I was induced to try it, and I must say that in my experience it has done all that could be desired. Then it can always be procured; not only that, but it can be procured readily, which is an invaluable advantage in this disease, for before the malady has had time to prostrate the animal, you have it *headed off* as it were, and before other remedies would have time to act, with this one the animal is often on a fair way towards recovery.

“Before applying the *cold wet pack*, the owner or attendant must make up his mind to do the work thoroughly, or perhaps it will be better not to do it at all. So for the benefit of those who wish to try it, I shall now describe the manner in which I proceeded in detail. Before putting on the sheet I consider it a good plan to rub the animal, say for four inches on both sides of the center of the spine, and from the withers to the tail, with the best mustard, made up as for table use, and rub in for about fifteen minutes. This may be left on for two days. To apply the pack take, say a bed sheet and ring it out of cold water and wrap it around the cow; every part but the head may be covered; if one sheet is not large enough sew two together. On top of the sheet place say, two pair of the lightest and warmest

blankets that can be obtained. Nothing could be better than these light cotton batting comforters, so popular now in every household. Over all place an oilcloth of some kind, or other close fabric that will keep the heat in. Those parts of the body, the legs, etc., which are not covered by the sheet must be covered with straw or other material, for they must be kept warm. In the course of half an hour or so after the pack has been applied the body will be thrown into a profuse perspiration, and will continue so for an hour or so, but as soon as the skin begins to get cool, then preparation must be made for a second pack, and the changing must be quickly affected, or too long exposure will do more harm than the next pack will do good. If the wet sheets can be changed without removing the top coverings, all the better. Some animals are exceedingly restless during the progress of this disease and it is these that give so much trouble and require constant watching to keep the pack in its place. Others will show much uneasiness of the head, which may be modified by tying cold, wet cloths around and across their horns. With regard to the length of time the pack requires to be applied I cannot say; in my own experience the symptoms have always been relieved in twelve hours, sometimes in half that time. After it is taken off care must be taken that the skin is kept moderately warm. While the symptoms last the cow must be kept from throwing itself over on its side; this may be done by packing sacks filled with straw against its sides. The milk should be drawn several times a day, and the bladder emptied; this latter operation generally requires the assistance of a veterinarian to show the attendants how to do it. When certain complications occur, such as distention of the rumen with gas, etc., the remedies which are calculated to relieve them must be used, but I think these should be left to a veterinary surgeon. But to return once more to the pack, I may say that I have had experience with it which justifies me in saying that it will often overcome the disease without any other treatment, and even if it does not in all instances it will at all events keep it in abeyance until proper veterinary assistance can be procured. When the

animal recovers it should be fed for a few days, say a week, on soft diet and receive a little daily exercise."

SOME LESSONS FROM THE SEASON.

By G. E. MORROW, Professor Agriculture, Illinois University:

The one striking characteristic of the year 1887 in its relation to farming over much of the west was the extreme and long continued drouth. Perhaps in no former year has Illinois, as a whole, suffered so severely from drouth. Dairy men suffered as much as almost any other class of farmers—always excepting those in the southern part of the state, where a great plague of chinch bugs destroyed much that the drouth had spared.

Prices for dairy products were good; low during the summer, but not lower than in some former years. Prices for surplus dairy stock were and are unusually low. This largely consequent on the drouth.

For years I have believed one chief object to be aimed at by progressive farmers in experimentation and changes of practice is lessening cost of production. Sometimes this will be best secured by increasing the quantity produced, but not always.

The drouth greatly increased the cost of producing dairy products. Foods purchased cost more; more labor was required in caring for and feeding the cows—in some cases scarcity of water caused expenditure of labor and money. The milk product was decreased or only maintained at a marked increase of cost.

The most obvious lesson is the necessity for better provision for economically supplementing the pastures in summer, in time of drouth, and utilizing farm products for winter feeding.

Either milk or beef is most cheaply produced when the chief food is good pasturage. This may be profitably added to, but we have not come to the time when any other system of summer feeding is so economical as pasturage. So far as both pasturage and hay are concerned the great drouth has increased my appreciation of the value of red clover and orchard grass.

Admitting that neither is of the very highest excellence in all points, their rapid growth in spring, unusual ability to withstand drouth; prompt starting growth after being grazed or cut, and large yield make them very valuable.

But no plant has probably so deservedly grown in popular appreciation as has indian corn. I believe no other one plant grown in Illinois furnishes so large a quantity or so great a value of food for the cow as does a well managed corn crop. It is not a perfect food, neither when green or dry; fed in summer or winter; from the stack or silo; with or without the grain, can it merely be made the sole food for the dairy cow. But more acres in indian corn seems to me avdisable on many dairy farms.

The silo has pretty certainly come to stay, but it will not probably soon come into general use. Its value has often been over-estimated, and the reaction from extravagant claims has had a considerable effect. But the silo is not necessary to profitable use of indian corn—stalk as well as grain. Planted twice as thickly as when grown for the grain alone, in fact early in the season and of an early maturing variety, it will furnish a great mass of good food in summer or drouth, or in fall and winter. The labor of husking may be saved and good food be secured by cutting stalk and ear together.

Millet and Hungarian grass, with their unusual fitness for growth in dry climates, may profitably be included among the minor crops of the dairy farm. I am not convinced that roots can profitably be grown in Illinois to be used as any considerable part of the food of the cows.

The season has given emphasis to my long-time belief that extensive dairy farming is not the safest course. Many exceptions admitted, I believe it is safer for dairy farmers, as a class, to produce something of other products for sale.

I am well convinced the idea of the "special cow" has been pushed too far in public and private teaching. There is an important truth in it, but that truth may be distorted.

This season's experience confirms the belief that "butterine"

is to be a permanent competitor with butter. Attempts to prohibit its manufacture, I believe, will be a failure. There is as much probability of some of the present laws being modified in the interest of butterine manufacturers as that restrictions will be made more severe. Wishes and facts do not always agree.

Probably in no former years has there been so much evidence of general appreciation by dairymen of the need of possibilities of improvement; of the possible help from science helping practice.

There is encouragement for the future, in the fact that, probably, in the near future, large sums furnished by the general government will be acting and in experimental work in agriculture, and the importance of the dairy interest is such that it, without doubt, will receive a full measure of attention. Fortunately, too, in many lines the work of special interest to dairymen will be of equal value to other large classes of farmers. And again, it is fortunate that the work done in other states may supplement that done in any one.

We may expect too much—especially too immediate results, but we may safely look with well-founded hope to great good from this liberal provision—as yet inoperative—for experimentation in the interest of agriculture.

CHEMISTRY FOR FARMERS.

BY WM. McMURTRIE, Prof. Chemistry, Illinois University:

Is there such a thing as chemistry for farmers? Not long ago at a farmer's institute, after I had been holding forth for some time on a kindred subject, a farmer arose and said it appeared that the speaker seemed to consider a farm a big chemical laboratory, and all that was necessary for the farmer to do was to put this and that together and get a product. I did not reply to the remark, but I felt a good deal, and I felt that our friend had expressed a truth without knowing it, for there is no question in my mind that the farm of every intelligent proprietor is a chemical laboratory, and that every good farmer is a chem-

ist working in that laboratory to some good and useful end. The best and ideal farmer is, and should be, a good chemist, even as he must be a good botanist, entomologist, zoologist, geologist, machinist, engineer and banker. There is really no profession or trade which does not find practical appliances on the farm useful. In the every day work as practical chemists we pick things to pieces to find what they are made of; we put things together to see what they will make; we study the products to see what they are good for and how they can most profitably be used—and which I shall endeavor to show good farmers do every day. Yes, there is a chemistry for farmers just as much as there is a chemistry for the manufacturer of iron and steel, the manufacturer of starch, of glucose, of soap, aniline dyes, of drugs, spirits, of gas, of oil, of paints, of fertilizers.

Manufacturers in each one of these lines employ educated chemists at great expense to guide them in their work, and make no move not directed from the laboratory. The science is no less important to the farmer.

And now you are beginning to inquire what is this chemistry for farmers? How may farmers serve as their own chemists and make their own farms their laboratories?

It has been said that the easy way to answer a hard question is to ask another equally hard. The Westminster Catechism asks first: "What is the chief end of man?" I shall ask what is the chief end of a farmer? I know some cynic is swearing to himself, and possibly to his neighbor, to follow the advice of the quaker father to his son, "Get money, honestly if thee can; but get money." Perhaps that's so in a measure, but the farmer is by no means alone in that. He isn't farming wholly for fun any more than a lawyer is looking for fun when he loafs around a court house a couple of weeks at a time waiting for his solitary case to come up after various and sundry postponements. Making money may be the ultimate chief end of the farmer, but there are several important means which lead to this end in which the application of this great science of chemistry are involved.

This, then, I believe to be the chief end of the farmer, and I believe every farmer will sustain me in it: It is to so manage the soil of his farm as to produce from it the largest returns in food for man and beast. Is not that sufficiently broad? Think it over and see.

What then of the soil? It is the great reservoir of food for the plant, and while formerly it was only necessary to stir it up a little to cause it to give up this food, the time is coming, and in many sections of this and other states west of the Alleghanies has already come, when something more is necessary when the reservoir has been to a large extent emptied, and the soil, in the familiar terms, has become exhausted; when it can no longer yield up those substances upon which plants are known to subsist and upon which the abundance and wealth of our crops wholly depend.

In another place I took occasion to say that the maintenance of the fertility of the soil is in all respects the most important consideration the intelligent and progressive farmer of the present day, whatever may be his location or surroundings, has placed before him. No farmer, whatever be his station or his education, is ignorant of the fact that each succeeding crop takes something from their fertility; takes something absolutely necessary to the development of the crop and leaves the soil correspondingly less capable of producing crops of equal quantity and quality in the following years.

Among the states west of the Alleghanies it has been common within the recollection of men now living and probably here present to see the wheat crop enormous on the virgin soil begin after a few years to fall off and gradually decline from a magnificent start of 30 to 40 bushels per acre to 15, 12, and even 10; the quality of the product declining with the yield. Ohio knew it first. Indiana experienced it. Illinois has felt the importance of this fact, especially in the southern counties, and even Minnesota, so celebrated for its broad and continuous areas of wheat, and the high quantity and quality of the product has furnished its quota of statistics to support the state-

ment just advanced. The Mississippi valley was not broad enough or deep enough to stay the progress of this soil exhaustion, and the fertile valley of the Red river of the North, or the broad plains of the far west will be no less powerless under the practices always, and perhaps necessarily, prevalent on pioneer farms.

The practice of "robbing the mine," as it were, has been almost universally acknowledged, but the farmers of the west have, as a rule, remained heedless of its results, as long as the soil yielded plentifully enough to meet a demand, or until stern necessity forced a halt. And now there comes from many parts of our own state an earnest cry, "What shall we do to be saved from this ruinous spoliation? How may the lost fertility be restored? What may we apply to the soil in order that it may be enabled to give its accustomed yield?" To some these questions are all important *now*. They must surely become so to *all*.

To answer these great questions we enter first upon the work of the great chemical laboratory of the farm. That work, applied to a study of the soil and of the crop produced from it has shown if it were necessary to go into the market and buy the plant food removed from the farms of Illinois by the crops of a single year the enormous sum of \$86,079,356 would be required. This is some of the money our cynical friend remarked the farmer was trying to make.

The questions now naturally arising are, "What are the substances which are worth so much? In what amounts and in what condition are they ordinarily found in the soil? Why should they be so rapidly used up? How can their absence in the soil be determined, and what can be used to restore them to the soil?" These are the questions for which you must turn to chemistry for an answer, and which experiment in the farm laboratory must work out.

Among all the substances needed by the crop in its development, nitrogen, phosphoric acid and potash, are the most important. What they are may be best explained to those who

do not know, by illustration. The egg is the simplest of all animal forms of matter. The white of the egg consists of water and albumen, and any albumen contains about 16 per cent. of nitrogen. Good lean meat, beef, mutton or pork, contains, when free from fat, about 75 per cent. of water and 25 per cent. of substance, which, like albumen, contains 16 per cent. of nitrogen. Bones likewise contain about 30 per cent. of gluten, which has about 16 per cent. of nitrogen, while they also contain phosphate of lime to the extent of about 60 per cent. Flesh and blood likewise contain potash, and milk contains all these substances. Animals cannot get along without bones, so phosphate of lime is essential to the animal. The animal must take this substance entirely from its vegetable food, so it becomes to this extent, if to no other, essential to the plant. All these substances then, chemistry teaches, must exist in the soil, and the farmer must put them into condition to be readily obtained by plants if he would secure good crops.

How much of each should a good soil contain?

A standard authority declares that a good soil should contain 90,000 pounds of potash in a layer of one foot deep, covering one acre, and that in the same space a poor soil should contain 40,000 pounds. So, too, a good soil may contain 15,000 pounds of phosphoric acid in form of phosphate of lime. The nitrogen of the soil varies largely, but may even exceed in quantity the other substances named.

These substances seem enormous when we consider how much may be removed from an acre, by each of our leading crops, say corn, oats or wheat. Corn, which is the most exacting, removes each year per acre, N. 60 lbs., K_2 O.56 lbs., P_2 O5.30 lbs.; oats removes N. 30 lbs., K_2 O.30 lbs., P_2 O5.12 lbs.; wheat, N. 51 lbs., K_2 O27.3 lbs., P_2 O5.21 lbs. Why, then, should the soil become exhausted? Because these substances occur in the soil in conditions in which they cannot be taken and utilized by plants. Straw or wood contains nitrogen, which ultimately may serve for plant food, but first the straw or wood must rot and decay, in order that the nitrogen may be changed

to forms suited to the plant, and decay is slow. The black matter of the soil is vegetable matter in process of decay and the nitrogen it contains is used as the decay progresses.

A granite rock contains 3 to 5 per cent. of potash, but everybody knows it is not soluble in water. It may also contain phosphate of lime; also useless to the plant. Soil consists of broken down granite or other rock in finely divided particles. These particles, acted upon by the carbonic acid of the soil, by frost and air, slowly give up the potash they contain, and this is used by crops. In virgin soil such preparation has been going on for centuries and the stock of prepared plant food is plentiful. But continued cropping uses up this stock and the time finally comes when the crops must depend upon the food gradually liberated from the inert forms by the atmospheric and other agencies always acting. But these agencies may not work fast enough and then the farmer must turn chemist and help. He plows; he exposes the black matter to the air and it decays faster, supplying nitrogen to the crop. By its decay it furnishes carbonic acid which may act upon the particles of granite and set free the potash and phosphoric acid. He drains his land to take water out and let air in to effect these same changes. All these are the operations of a chemist as much as dissolving iron or steel in acid in the process of analysis is the work of a chemist. These substances then are plentiful in every soil, but in forms which they cannot be utilized by the plant. They may be changed to available forms by natural agencies, and these may be aided by the operation of tillage.

But it may happen that with all the various agencies acting and the most careful tillage either one or all of these substances fail to become available as fast as they may be needed by crops. This may be true of only one, and then the soil is as truly exhausted as if it were true of all. Then the farmer must become the analytical chemist; make analysis of his soil, find out which is the wanting element, and what he must add to the soil from some external source in the form of fertilizer.

I know full well a good many farmers before me have al-

ready exclaimed to themselves what nonsense! "Can't be done." But it can, and should. And it can be done in this way: Get the forms of phosphoric acid—best in bone ash, the forms of nitrogen, best as sulphate of ammonia, or dried blood or nitrate of soda, the forms of potash. Lay out some plots in the field, all of the same size. To one plot apply one of these substances, say phosphoric acid, to another nitrogen, to another potash, to another phosphoric acid and nitrogen, to another potash and nitrogen, to another phosphoric acid and potash, to another apply all. Grow crops upon the plots, carefully harvest and weigh them. The quantities yielded by the several crops will vary and the variations will serve to show what substances must be added to the soil of the field experimented upon in order to produce the best crop. And after all the farmer will have made a practical chemical analysis of his soil.

An illustration of this is found in an experiment made on the experiment station at Gembloux, in Belgium, upon clay soil and sandy soil:

ON THE CLAY SOIL.

Nitrogen produced.	Per cent. increase.
	146 to 150
N.+P ₂ O ₅	146 " 150
N.+P ₂ O ₅ , K ₂ O	146 " 150

ON SANDY SOIL.

Nitrogen produced.	Per cent. increase.
	150 to 250
N.+P ₂ O ₅	330 " 370
N.+P ₂ O ₅ , K ₂ O	480 " 524

The clay soil required then nitrogen, but no phosphoric acid or potash, while the sandy soil required all.

So, too, the director of the Experiment Station of New Jersey, induced the farmers of that state to make similar experiment, with expenditures for nitrogen which in this state would cost \$1.76, for phosphoric acid \$3.25, and potash \$3.20, to be applied

to an acre, they secure with the \$1.76 increase in the corn crop worth \$3.09, with \$3.25 of phosphoric acid \$6.69 of increase, with potash \$3.20, increase worth \$7.05. The phosphoric acid increased the value of oats crop \$7.68 per acre, while the increase in wheat amounted to for nitrogen \$6.54, for phosphoric acid \$8.67, for potash \$7.39. The values for increase are based upon Illinois prices for the several grains.

This is practical chemistry on the farm.

The figures are interesting and enticing. To increase the wheat crop \$7.39 per acre, with no additional work and only \$3.41 cost, is in every way desirable. But this was produced where the crop was 14.3 bushels per acre, when the corn yielded 20 bushels and the oats 20 bushels. Where the product of Illinois is so low there these principles should be applied and the manure from the stable first of all, then lime and land plaster and finally the waste products of the packing-houses of the stock yards of Chicago and elsewhere should be used to supplement the supplies of plant food of the soil where it has been determined which of these is wanting. The hog and cattle tonnage of the packing-houses supply very cheap and valuable forms of N. and P_2O_5 ; while the potash salts imported from Germany supply the needed potash.

We have here an indication of some of the applications of chemistry in the farm laboratory. We might extend our applications to the feeding stable and the dairy, but I promised not to punish our worthy chairman too severely. There is probably no line of agricultural work in which so great economy can be effected as in the intelligent application of the principles of the great science of chemistry to the feeding of farm animals either for meat or milk. And the intelligent farmer cannot better inform himself in this line than by carefully reading Prof. Armsby's valuable book entitled "Cattle Feeding." Farmers as a rule are afraid of books, but they are as ready as any one to acknowledge that one cannot be too old to learn, and they must also acknowledge that few things are as valuable as a good book. To gather from such sources the applications of

chemistry to economy in feeding and to use them in every day work will surely produce more meat and milk, and better meat and milk than is obtainable by many of the methods now in vogue.

There is a chemistry for farmers therefore that can be applied in every day life, that can produce economy oftener, economy of labor, economy of patience, with increased crops and products, and hence, increased happiness and content.

The report of the Executive Board was received by the convention as follows:

At a meeting of the Board of Directors of the Illinois State Dairymen's association, held on the 16th day of December, 1887, the following officers were unanimously elected:

President—Lovejoy Johnson, Stillman Valley.

Vice President—W. R. Hostetter, Mt. Carroll.

Secretary—R. Lespinasse, Chicago.

Treasurer—Jas. H. White, Aurora.

REPORT OF OFFICERS.

PRESIDENT JOHNSON:

Gentlemen—I will say I thank you, and when you hear that from me it means a good deal. I thank you for the honor, for I consider it a very distinguished honor.

TREASURER'S REPORT.

Dec. 11, 1886,	balance on hand.....	\$ 833 46
" " "	Cash received for membership fees....	101 00
" " "	Subscription to premium fund at Dairy Show.....	5 00
Jan. —, 1887	Membership fees	5 00
Dec. 1, "	State appropriation	500 00
Total.....		\$1,444 46
Dec. 11, 1886,	Bill Doherty & Hemmens, printing.....	\$ 14 50
Jan. 3, 1887,	Board of secretary and re- porter at convention.....	14 85

Jan. 5, 1887,	Mrs. R. H. Kelley, reporting at convention proceedings.....	62 00	
Feb. 28,	“ W. D. Hoard, services at convention.....	25 00	
“ “	“ Lowrie & Tomlinson, printing.....	4 50	
Mar. 7,	“ A. E. Smith, printing annual report.....	140 85	
“ “	“ R. P. McGlincey, salary, postage, etc.,.....	167 30	
Nov. 30,	“ R. Lespinasse, postage....	50 00	
Dec. 3,	“ A. J. Albrecht & Co., printing, etc.....	14 26	
“ “	“ The Dairy World.....	62 20	
“ “	“ R. Lespinasse, circulars, etc	14 83	
“ 13,	“ R. Lespinasse, salary.....	50 00	\$ 620 18

Leaving a balance in my hands..... \$824 18

All of which is respectfully submitted,

J. H. WHITE, Treas.

The Secretary: *Gentlemen of the Association*: “I have not very much to say. Since I have lived, I have tried to live well, and always aimed to make my deeds tell as well as my words. After I took possession of the office to which the board called me, the field seemed to need some overhauling, and I proceeded at once to work, as thoroughly and energetically as possible with the means in my possession, stirring up the dairymen of Illinois a little to the importance of having an annual meeting that would be a credit to the state. Through the kindness of a great many of the dairy implement makers, salt dealers, color dealers, etc., confined to those having representatives in our state, and a few of the immediate neighborhood, we were enabled to present to the dairymen of Illinois a small premium list. It proved enough inducement for them to bring some samples of butter, and the result of that show you already know. The work of the secretary's office has been quite heavy. We have handled since the first day of last June some fifteen thousand pieces of mail matter. The work of the office is constantly

growing. It is an important necessity that our organization should extend to every section of the state, that it should be made an organization of the state of Illinois in the very fullest sense of the word, that we should have have such an organization as will control the voice of our legislature, for upon them we must depend for the future progress and success of this association. I have investigated this matter thoroughly; have talked it over with different parties, and have tried to learn the feeling upon the question of this Illinois State Dairymen's Association throughout all parts of the state. I feel satisfied that if we will all put our shoulder to the wheel and make our best effort to assist the officers of the association in the work that they will undertake for the coming year, success will be realized. At the next meeting of our association we hope to have several thousand dairymen on the membership list and let our legislature, which will be just approaching its biennial meeting, know that we are alive and well."

Mr. Boyd: "I move that the sincere thanks of this association be tendered to President Johnson and to Secretary Lespinasse for the very able and efficient manner in which they have discharged the duties of their offices for the past year."

The motion was seconded and unanimously carried.

THE CARE OF FARM ANIMALS—ESPECIALLY IN RELATION TO FOODS.

BY JONATHAN PERIAM, Associate Editor *Farm, Field and Stockman*, Professor, Hygiene, and care and management of Animals, Chicago Veterinary College:

One of the most important questions for the farmer, the breeder, the feeder is the proper care of farm animals. Proper feeding is of especial importance to the dairyman, for upon this rests not only the flow of milk but its integrity, as containing the essentials that shall make the outcome of his investment

profitable. I do not mean by this that food containing more or less of the necessary constituents of milk will render the milk poor in these essentials, but in proportion as the lack of all the constituents of milk in just that proportion will be the diminished flow. That is to say the milk product will be in proportion to the food, containing all the normal qualities of milk. If our integer is less than it should be the milk product will be in direct proportion thereto after the animal system shall have been deprived of what it has held independent of what the food contained. It is well known that in winter where animals do not get sufficient food, that first the fat shrinks to supply waste of heat and the muscle shrinks also to supply waste of muscular action. This is the key to the whole situation.

It is an axiom in the cultivation of the soil that all the constituents required by the plant must be in excess, in order that a superior crop can be grown. The same rule will apply in the feeding of animals, where a large outcome of labor, meat or milk is to be taken. Hence the necessity of so formulating the food given that it shall conserve the particular requirement sought. It is a general rule in feeding for growth that the food given shall contain what chemists call one part of flesh formers to four parts of fat formers. The flesh formers nourish the muscular development, and the fat formers furnish heat forming material and lubricating material for the system. In winter feeding the fat formers—starch, sugar, gum, oil, etc., should be in greater ratio than in summer, and for the reason that then there is a greater waste of heat than in summer, but at the same time the flesh formers, the protein compounds, albumen, gelatine, or other nitrogenous matter must be furnished in full supply, and both the former and the latter in just proportion, to the exposure of the animal to cold and to the degree of muscular exercise taken.

Let us now see what the fat of animals is composed of—simply a form of carbon.

The fat of animals is worthy of consideration. The oily portion seems identical in all. The solid portion differs. In man

the goose, in butter and olive oil, it is margarine. In the solid fat of the ox, the horse, the pig and sheep it is stearine. The hair, horns, hoofs and wool of animals are largely composed of nitrogen in connection with the chlorides, and phosphates, and also hold about five per cent. of sulphur in the form of soluble and insoluble sulphates.

It often becomes important to know the constituents of foods in order to arrive at economy in feeding. Let us take milk, a perfect food for all young animals. Why? Because it contains all the essentials of growth in normal proportions, as taken from the dam, by the young of the same species. A number of analyses of cow's milk, compared and averaged, have given the following:

ECONOMICALLY.

Water.....	86.0
Flesh formers.....	5.0
Fat formers	8.0
Mineral matter.....	1.0

ACCORDING TO CONSTITUENTS.

Water.....	86.0
Caseine.....	5.0
Fatty matter.....	3.5
Sugar.....	4.5
Mineral matter.....	1.0

Thus we see that the flesh formers are represented by the caseine, and the fat formers by the fatty matters and the sugar. The difference is simply in the two components of the fat formers, fat and sugar both being forms of carbon, and produced from the starchy and oil in the food. In feeding calves with skimmed milk we have removed only the fat. This is easily replaced with finely ground cooked corn meal, with a very little oil meal, not oil cake, added.

In the case of feeding whey we have a far more difficult problem. We have removed everything from the milk except the water and a little sugar. Hence we see that a calf should not be fed skimmed milk with mush and lin-seed meal added

until it is four weeks old, and it should not be given whey until it begins to eat grass and oats freely.

The animal until it attains its growth requires different food from what is necessary during the fattening stage. It should have food rich in nitrogen as well as in starch, and in the feeding of cows for milk food rich in albumen is as necessary as food rich in fat formers.

A full ration for a working horse or a cow in full flow of milk may be stated to be, daily, $\frac{1}{2}$ pounds of grain, $1\frac{1}{2}$ pounds of hay and for each 100 pounds of live weight. Thus a cow weighing 1,000 pounds should receive a daily ration of 30 pounds of dry food. For fattening, the grain ration may consist chiefly of indian corn, but for labor or milk the ration should be largely of oats, barley or a mixture of the cereal grains. Mixed grasses form a perfect food, so do a mixture of well cured hay and the cereal grains.

The animal to add 100 to its muscular substance, in addition to that consumed in daily waste, must assimilate 77 pounds of water, 22 pounds of fibrin, with a little fat, $\frac{2}{3}$ pound of phosphate of lime and $\frac{1}{3}$ pound of saline matter. To add 100 pounds of bone it must assimilate 35 pounds of gelatine, 55 pounds of phosphate of lime, 4 pounds of carbonate of lime, 3 pounds of phosphate of magnesia, and 3 pounds of soda, potash and common salt.

We therefore must supply to the animal economy mixed foods to give:

1. Starch and sugar as carbon, which is given off in respiration.
2. Fat or fatty oil to furnish the adipose matter necessary to all animals.
3. The gluten or fibrin to renew the constant waste of the muscle and cartilage.
4. The phosphates to renew the natural waste of the bones.
5. The saline substances—sulphates and chlorides—to provide for the daily evacuations passed off by the secretions.

The ox of 1,500 pounds weight consists chemically of the following substances:

	lbs	oz.
Oxygen.....	1080	...
Hydrogen.....	140	..
Carbon.....	209	..
Nitrogen.....	36	..
Phosphorus.....	11	6
Calcium.....	20	..
Sulphur.....	..	5
Chlorine.....	1	5
Sodium.....	1	7
Iron.....	..	2½
Potassium.....	..	6½
Magnesium.....	..	¼
Silica.....	..	20 grains.

The oxygen is combined with the phosphorus to make phosphoric acid; with the calcium to make lime; with the sodium to make soda; with the magnesium to make magnesia, and with the potassium to make potash.

Now, if we add the oxygen and hydrogen together we have what? 1,220 pounds of water as one of the component parts of the 1,500-pound ox. The phosphoric acid is combined with the lime to make phosphate of lime, of which the solid parts of the bones are made; the chlorine is combined with the sodium to make common salt. The oxygen, hydrogen, carbon, nitrogen and sulphur are combined to form the fibrine of the flesh; the albumen of the blood (or that part which forms the clot) and the gelatine of the bones; the oxygen and hydrogen are combined to form the water, of which nearly 1,100 pounds of the 1,500 are composed; and the carbon, hydrogen and oxygen are combined to form the fat.

The substances found in the body of the ox are as follows:

	lbs.	oz.
Water.....	1,070	..
Gelatine.....	150	..
Albumen.....	42	..
Fibrine.....	42	6
Fat.....	120	..
Ashes.....	75	10

The gelatine, albumen and fibrine are what are known as nitrogenous or albuminoid substances. They are composed as follows:

Carbon.....	53.00
Hydrogen.....	7.00
Nitrogen.....	16.00
Oxygen.....	22.50
Sulphur.....	1.50
	<hr/>
	100.00

Fat is what is known as a carbohydrate, because it consists of carbon, hydrogen and oxygen, or really of carbon and water, or carbon hydrate. Fat of various animals differ but little in composition, and generally consists of:

Carbon....	76.50
Hydrogen.....	12.00
Oxygen	11.50
	<hr/>
	100.00

The skin, hair, horn, wool and feathers of animals are nitrogenous substances, consisting as follows:

Carbon.....	51
Hydrogen.....	7
Nitrogen.....	18
Oxygen (with some sulphur).....	24
	<hr/>
	100

Each of these substances differs a little from these quantities which are freed from fractions and given in even numbers. Such is the composition of animals, and as has been stated, the food must necessarily contain similar elements or it cannot contribute to the healthful nutrition of the animal body.

Hence, the skillful feeder will not only change the food from time to time, but also to vary the properties, he will adapt the kind and quantity of food to the age of the animal, according to the purposes for which it is fed. The young animal requires especially, food rich in nitrogen, or, more properly, the protein compounds, which contain nitrogen. To show the close identity of these, both in animal and vegetable life, the three tables of albumen, fibrin and casein will serve. Albumen is the chief constituent of the eggs of fowls, and of the milk of animals. Fibrin is the principal element of the muscles of animals, and it forms the clot and globules of the blood. Casein is also a constituent of milk. It is identical with the legumen of beans, peas and the seeds of all other leguminous plants.

ALBUMEN.

Name.	Animal.	Vegetable.
Carbon.....	53.5	53.7
Hydrogen.....	7.1	7.1
Oxygen.....	23.6	23.5
Nitrogen.....	15.8	15.7
	-----	-----
	100.0	100.0

FIBRIN.

Name.	Animal.	Vegetable.
Carbon.....	52.8	53.2
Hydrogen.....	7.0	7.0
Oxygen.....	23.7	23.4
Nitrogen.....	16.5	16.4
	-----	-----
	100.0	100.0

CASEIN.

Name.	Animal.	Vegetable.
Carbon.....	53.5	53.5
Hydrogen.....	7.0	7.1
Oxygen.....	23.7	23.4
Nitrogen.....	15.8	16.0
	<hr/>	<hr/>
	100.0	100.0

An interesting fact in this connection is that all three of these substances are nearly identical in their composition, and they contain largely of that costly substance in agriculture, nitrogen. We have shown the importance of fibrin in the muscular tissue, and of caseine in milk.

Albumen abounds in material for making bone, muscle, cartilage, the nails, claws, horns and hoofs. In fact, the horns of animals are almost entirely composed of albumen. In the fluid state albumen is found in the serum of blood and the whites of eggs. Exposed to heat and air, it easily putrifies. It coagulates at 180 degrees Fahrenheit, and dry, it is brittle, transparent, and resists decay. Besides its nitrogen, it contains some sulphur and sometimes phosphorus.

Now, in health, the animal may pretty safely be left to judge for itself of what is necessary as food. That is, if fed full rations of hay and grain, it will sometimes take more of one than of the other; but in changing their grain rations, care must be taken that they are not given too much. For instance, if the ration has been a peck of oats per day, this must not be changed to a peck of corn, but to the same number of pounds of corn as was given of other grain. The want of knowledge in this respect leads many stablemen into serious difficulties with their stock, generally from the eagerness of the animal for a change of food.

It will not be necessary to follow the subject farther at present, except to give a few examples from actual practice with the average daily gain, in fattening cattle. Here is the

daily ration of forty steers, from actual practice, averaging 900 pounds, and gaining two and a half pounds of flesh per day. Their food was:

Oat straw.....	480 pounds.
Hay.....	200 "
Corn meal.....	240 "
Bran.....	160 "
Linseed meal.....	80 "
	<hr/>
	1,160 "

The forty head consumed 1,160 pounds each, daily. An average of 29 pounds each. Analytically, this is nearly a perfect food, but hardly up to the standard in albuminous constituents.

A more highly artificial food is shown in the following ration fed to ten steers for ninety days, the gain being three pounds per day, and the average weight, for ninety days, of the cattle, being 1,348 pounds. By analysis, this would show a wide departure from a perfect food; but the straw was cut into inch lengths, the grain was ground and the whole mixed together and cooked, except the hay, which was fed in the natural state.

Cooking has heretofore been supposed to assist in the more perfect assimilation of the food. The following table shows this ration:

Oat straw.....	150 pounds.
Hay.....	60 "
Corn meal.....	70 "
Pea meal.....	30 "
Oat meal.....	30 "
Linseed meal.....	10 "
	<hr/>
	350

This would be an average of 35 pounds each head per day. The steers averaged 1,210 pounds when stabled, and 1,485 pounds at the end of ninety days. The meal ration was 10 pounds each head for the first two weeks, and gradually

increased to 16 pounds at the end of sixty days, making the average ration 14 pounds each, the straw in each case serving to keep a proper distension of the stomach, thus insuring a perfect digestion.

I wish here to say a word in relation to cooked and especially ground food, with hay or straw, cooked all together. If long followed with working or hungry animals it will certainly impair digestion, from imperfect salivation in mastication. In the case of animals that are being ripened (fattened) for the butcher, the proposition will not hold good, for two, three and four months will finish the animal ready for slaughter.

To summarize the whole matter in relation to what constitutes a balanced ration, we must remember that two leading elements characterize all foods and give to them a corresponding designation. These elements are carbon and nitrogen, and the designations are carbonaceous and nitrogenous. The mineral elements, the ash of plants are generally found in sufficient quantity in all mixed rations. The carbonaceous foods are those in which the element of carbon is in excess of the proper quantity for a balanced ration. The nitrogenous foods are those in which nitrogen is in excess. The balance for milk production and for practical work ought to be about one part of nitrogen to four parts of carbon in summer, and one part of nitrogen to six parts of carbon in the winter, when more carbon is required to keep up the temperature of the body. This makes an average ration consist of one part of nitrogen to five parts of carbon, which may be considered a well-balanced fall and spring ration. Economy in feeding, as well as the health and comfort of the animal, requires that the food given for the day should be so proportioned as to afford the proper amount of carbon and nitrogen and thus constitute a truly balanced ration. If each foddering is not so balanced, one foddering may balance another. To approximate this balance requires a knowledge on the part of the feeder of the character of the food at his command. Such knowledge should be a part of the education of every man who raises stock of any kind. He cannot practice true economy without it.

QUERY BOX.

RAISING CALVES ON SKIM MILK.

Methods are varied and plans abundant in this particular line of work.

An old hand in the *St. Paul Farmer* brings out a very good system which he calls a way of selling butter or cheese, or cream all the season round and turning out two good calves, all from one good cow. How to solve the above is the object of this query and we excerpt the points which this correspondent makes:

"The plan is not my own," he says; "I picked it up from a capable little Scotch woman who had been raised in a good dairy country, and began after coming to the far west to make the money by dairying that her husband quite failed to do by grain farming. She began five years ago with one good little cow, some 750 pounds in weight, and will this year milk thirty-five. She is at this minute raising over a dozen nice, thrifty growing calves on skim milk and a bite of oats or linseed oil cake; either will do if you cannot have both.

"For a fortnight only the calf get its mother's milk straight. After that crushed oats, or a few little nubs of oil cake, or both together, in a small trough readily accessible, which it soon begins to munch. The skim milk is warmed up morning, mid-day and evening to blood heat. When the calf gets older it drinks only twice a day sweet, warm skim milk, and flourishes apace. Once the oatmeal and cake were boiled, with very unsatisfactory results. They do much better and save a deal of work by being used dry. Butter at 25 cents a pound taken from the milk, is replaced with cake at 1 cent, the difference is the pay and profit on well-spent labor. Good butter and good skim milk calves is the order of business. No pot bellies and lean quarters, but nice bright eyed creatures that make good heifers or steers, and the money is flowing in all the year round, while the herd grows bigger year by year through natural increase."

Prof. Stewart reports that he has raised many calves from

ten days old on skim milk, flaxseed, fine pollard and oats. His plan is to add to the milk linseed jelly, made by boiling flaxseed in six times its bulk of water for an hour. Ordinary skim milk, he says, contains about 0.7 per cent. of fat, and, in order to add about 2 per cent. of fat, $5\frac{1}{2}$ pounds of linseed to 100 pounds of milk should be treated in this way. This is to be given in the milk at the rate of about one tablespoonful of jelly a day to each calf 10 or 20 days old, to be slowly increased to half a pound when the calf reaches 2 months of age. From 20 days on, a little pollard, about a tablespoonful at first, is added, until at 60 days about 1 pound may be given. At 60 days of age he gives a few oats, gradually increased within twenty days to 1 pound. If milk is plenty, say 20 pounds to the calf, the $\frac{1}{2}$ pound of linseed jelly, 1 pound of pollard and 1 pound of oats with the milk is continued during the first six months. If the milk is short after sixty or ninety days, the pollard and oats are increased.

Another method now in vogue and well recommended is to add linseed or cotton-seed oil to the milk. Some authorities believe the latter is cheaper and equally nutritious. About 3 per cent. of butter fat is removed in the cream; to replace this make an emulsion of oil and skim milk, using the same percentage of oil as butter fat removed. Both milk and oil must be heated to effect a proper combination.

BRINE SALTING BUTTER.

In answer to this query we quote the practical experience of A. L. Crosby who reports having tried this plan of salting for a number of years and gives directions as follows in the *National Stockman*: "As soon as the butter comes, and when the globules are about the size of millet seed or the head of a pin, stop the churn, and if the buttermilk is not needed for use in the house, put some weak brine in the churn—say half as much as there is buttermilk. Give the churn a few revolutions, then draw off the buttermilk. Put in more brine, enough at least to float the butter, churn a little more, and draw off the brine. Repeat until the brine runs out perfectly clear; then let the butter drain while you are making the strong brine for salt-

ing, which will be done by dissolving as much salt in cold water as it will take up.

Now put this strong brine in the churn in quantity sufficient to cover the butter, and allow it to stand for a few minutes until each globule of butter has a film of brine around it, and your washing and salting is done. The salting is at the rate of one-half ounce of salt to the pound of butter, and the butter is freer of buttermilk, and all other adulterations, than by any other known way of making it.

Take out the butter and put it on the worker or in the butter bowl, and work just enough to make it compact and to get out the excess of brine; then print or pack. But remember one thing, don't touch the butter with your naked hands in any stage of its manufacture."

DROUGHTS.

The protracted droughty seasons of 1886 and 1887 have called general attention to the subject of droughts and many conjectures as to its possible prevention have been advanced. We have been well aware of the influence of forests on drought areas, and in view of the importance of the question which interests every land owner, we have taken special pains to secure and take great pleasure in presenting the members of the Illinois State Dairymen's Association with a copy of a practical and exhaustive paper upon the subject, delivered before the last forestry congress in Springfield, by Dr. D. Berry, of Carmi, who said:

"A few years ago the systematic work of the United States signal service bureau established the fact that to the southwestward from the great lakes was a wide area of low barometric pressure which was persistent for several months in each year—notably during the spring and summer. This area has been called the great barometric trough of low pressure. It is in the form of an ellipse and is about 600 miles long by 400 miles wide. This area is subject to a great many frightful atmospheric disturbances, known as tornadoes, and to occasional periods of long-continued drought. It does not create these tornadoes, but fur-

nishes a grand field for their action after they are started on their career from other points.

It is the object of this paper to inquire as to whether these conditions can be modified and to indicate what appears to be the

SOLUTION OF THE PROBLEM.

But first we must note that this ocean or atmosphere is impelled in all its movements by identically the same force that moves the ocean of water, namely, gravity. All our atmospheric movements are simply adjustments of equilibrium. To appreciate how these movements occur, we have only to study the analagous movements of water currents. Water runs down hill. The air does exactly the same thing. As streams of water flow down from the mountains into the valleys in well defined channels, just so do the atmospheric currents move down from areas of high pressure, and are guided by the configuration of the lands over which they flow. This is the simple problem, but it is generally rendered complex by the intervention of other factors. The states of Indiana, Illinois, Iowa, Missouri and eastern Kansas, when considered in relation to sea-level, occupy a very low position. Any disturbance of the atmosphere above them, from whatever cause, either from shifting up by sun heat or a movement to supply the needs of other regions southeastward of us over the Atlantic would naturally lead to a flow of air from the higher lands westward of us. The rapidity and volume of this reinforcing stream will depend on two causes: First, the declivity of the hill down which it comes and the size of the space to be filled up. We can measure this descent, which has two elements, one of altitude and another of pressure. We can also measure the space to be filled—the barometer shows this without fail.

IN THIS LOCALITY

whenever we have an area of low pressure—which is nearly constant in the months of May, June and July—we must expect the equilibrium to be restored by an in-rush of air from the

plains to the southwest and west, which lie about 5,000 feet above us. At other seasons of the year, or during the fall and winter months, when the area of low barometer is southeast of us, over the Atlantic, the reinforcing currents will be from the northwestern high plateaus. When we look for the cause of this great barometric trough of low pressure, we find it due to two causes: The nearness of the great lakes and the natural consequence of the sun's heat upon them; and second, to the added fact of immense cultivation. There is no spot on the globe that presents as many consecutive square miles of ploughed land as this barometric trough. During the tornado period a bird's-eye view of the area would show thousands and thousands of square miles of plowed land prepared for corn, or only sparsely covered with oats or wheat; there is no vegetation to fix the sun's heat in permanent forms, and as a consequence this heat runs riot and rampant in the atmosphere. By reason of its reflection and radiation from the water soaked ground and lake surface, it lifts vast columns of vapor laden, heated air, that trend away to the northeast, to part with their vapor and dissipate their heat, thus following the general law of all super-heated streams of air and water, the world over, to flow away from the equator, only to return to it by well established ways as colder streams. To preserve the equilibrium or to restore the lost balance caused by this uplift, a demand is made on the atmosphere of adjacent regions.

"But why is it that the country lying to the south and west mainly supplies this demand? It is from the fact that during the prevalence of this barometric trough the atmospheric currents supplying the region come mainly from the south, being set in motion over the Gulf of Mexico by just such mechanism as prevails over the great lakes; and these currents from the south are reinforced by other currents from the great plains westward, giving a resultant in the southwest winds. These causes are too complicated and intricate to be dwelt on in this paper. Our interest is mainly with the westward factor in the problem. To fully appreciate this we must get a substantial understanding of

the physics and characteristics of the western atmosphere generally.

"This subject was presented in such a terse and concise manner by Capt. Silas Bent, of St. Louis, in a paper read by him before the Cattle Growers' convention, held at St. Louis in 1884, that I cannot do better than to quote it. He said in substance:

"The western winds, dry and cold from the steppes of Asia, in their passage to North America over the Kuro Simo, or equatorial current of Pacific, take up an immense amount of heat and moisture, reaching our shores saturated with vapor. They find an inlet to the land when the Cascade range breaks down. Flowing eastward they let down their moisture on the dome of the continent and furnish the water supply for our whole system of majestic lakes and rivers. But a different fate befalls those winds that enter the country south of Oregon. Here they are thrown against the western flanks of the Sierra Nevada, where they are robbed of their moisture and thus descend, cold and dry, on the plateaus of Utah and Arizona. In this condition they move eastward, with just sufficient moisture to answer the needs of vegetation on the slopes, and to whiten the crest of the Rocky Mountains. After this total depletion they reach the plains of Colorado and New Mexico. In this condition of dryness, but with their heat being constantly augmented by radiation from the parched plains, they keep on their movement eastward.

"Now, if you will notice, this barometric trough of low pressure, covering the states of western Indiana, Illinois south Wisconsin, eastern Iowa, Missouri, and eastern Kansas is not much more than at

GOOD DRAINAGE HEIGHT

above sea level, and is very low when compared with the plains westward, that tower 4,000 and 5,000 feet above it. When this fact is fully appreciated, in conjunction with a knowledge of the physical law that, like water, the air never moves until a way is opened for it and a demand made on it by gravity, we can

easily see how the air from the western plains will pour down into this barometric trough to equalize the pressure. The data gathered so far is not sufficient to warrant the conclusion that the prolific cause of our tornadoes, during May and June, is the inrush of these western cold, dry currents to the partial vacuum of the barometric trough, yet we have enough data on which to ground such an assumption. But when we come to consider the effect of these winds in the midsummer months, when, in their passage over the arid plains, they have changed their character from cold and dry, to hot and dry, we stand on surer ground. We know that when these winds join with the vapor laden air currents from the south, four effects are produced.

First—A change of direction of the combined currents from south and west to the northeast.

Second—A diffusion of the vapor borne on the southern current among the hungry air from the west.

Third—A general lifting of the combined currents by the great increase of heat from the western current.

Fourth—This increase of heat gives the combined current a firmer grip on its moisture and floating higher, as we have seen, enables it to carry this moisture further to the northeast, causing excessive drouths along its route.

Is there any way to change this condition?

There is a remedy, simple and practical; but from the nature of the case, immense in its application, and to succeed must depend wholly on the intelligent, comprehensive co-operation of the states interested. These western winds must be tempered with moisture. But how? We have seen that their natural base of supply for moisture is the Pacific ocean; that in their passage eastward they leave a great amount of this moisture, in the shape of snow-fall, along the crests of the Rocky mountains. This snow-fall must be utilized for irrigating purposes along the eastern slopes of these mountains. This is

THE PLAN OF ATTACK.

on the western side of the arid region. The instrumentality on

the eastern side must be the plough, advancing westward from the humid areas. I think there is now no question but that the steady advance of agriculture toward the southwest, in Kansas, during the past ten years, has projected the rain belt in the same directions.

“Under the old conditions of prairie sod the rainfall found an immediate passage into the drainage channels, leaving little or nothing to be returned to the atmosphere. Under the new conditions of the pulverization the soil is converted into an immense surface reservoir for the retention of the rainfall. I believe that this problem of tempering the western winds with moisture will, in time, be solved by the exigencies of our civilization by systematic field and forest culture, but it can be hastened by intelligent inter-state action. Let me show you what private enterprise is doing in Colorado, and I wish you to note its rationale: A company has tapped the Platte river in the Platte river canyon and by boring through a mountain brings the stream out on a high plateau of arable lands. The supply canal for these lands is about 80 miles long and is calculated to furnish water for 200,000 acres of ground. Under the old condition the surface of the Platte exposed for evaporation for this distance was not much over three square miles. This plan gives it an evaporating surface equal to nearly 200 miles. But we must measure its evaporating capacity by the area of the land that is irrigated.

A more just approximation would be reached by calculating the combined superficies of the leafage that the land sustains. The plant roots appropriate the water, and the leaves give it to the air around them. So that we see in this the fact that an irrigating ditch not only waters the ground, but practically pours that same water indirectly into the atmosphere if that ground be cultivated. It will readily be seen how every enterprise of this kind brings about a modifying influence, tending to laden the atmosphere with vapor. The facilities for extending this work are as yet barely comprehended.

Of one thing we may rest assured, the future of those states

and territories along the eastern slopes of the Rock mountains will see to it that not a drop of available water or snow-fall will be allowed to go to waste. There are thousands of places along these eastern slopes, in the narrow-mouthed gorges and canyons, where retaining dams can be built that will hold back the water from the melting snows in permanent lakes that shall form vast reservoirs available for purposes of irrigation. The cost of such dams should be slight compared with the wonderful results that would be accomplished. These results are not alone the climatic condition to be affected eastward, but are more far-reaching.

"When you reflect that all the devastating inundations of the Missouri and Mississippi rivers are mainly caused by the melting snows among the eastern slopes of the Rocky mountains, perhaps you will believe with me, that if all the money that has been expended on the levee system of the Lower Mississippi had been spent in building retaining dams to hold back this water from the snow-fall, we would have a Mississippi controllable without levees and regular showers on the arid plains; and you may also gather what I mean when I speak of intelligent, comprehensive interstate action in the premises. But rest assured that it is only by such means as is here indicated that forest growth on the plains can be secured, and you can only hope to map out the general plan. The details

MUST BE LEFT TO EXPERIENCE.

"You gentlemen of the Forestry congress must realize to its fullest extent this fact. Your labor and deliberations, your educations and deliverances will avail you nothing until the people shall have become generally enlightened as to the principles on which your work is based.

"Intelligent co-operation among the states such as alone will accomplish your end must first be prompted by the people at large. This is as it should be and is in accordance with the genius of our government. But you must first educate the individual into the belief and practice of this maxim: 'Thou shalt not benefit thy-

self at the expense of thy neighbor.' And further, a conservative, business-like interest for the general good in carrying out provisions when it shall be said: 'The wilderness and the solitary place shall be glad for them, and the desert shall rejoice and blossom as the rose.' He must be led to see that in the grand economy of nature there are no waste places, that he cannot tamper with those he considers such without positive injury to more highly-favored regions.

"It is necessary that such a sympathetic spirit may be created and fostered as will lead men in different parts of the country to see and feel that their interests are most intimately commingled and dovetailed together. For instance, when the farmer of Wisconsin or northern Illinois reads of a two or three years' drouth in Texas he must be taught to see that he has a direct interest in that fact, and that it closely concerns him. If this farmer is too old to learn then teach his child the fundamental principles of atmospheric law. First tell it what the father already knows by experience that nearly all the rainfall necessary to give him an abundant harvest comes on the vapor-laden air currents from the southward; show him that these air currents carry moisture in direct proportion to the heat they bear; explain to him how these currents traveling northward freighted with blessing for him are liable to be influenced by two very potent causes that effect his weal or woe; that when they pass over the arid regions of Texas their heat is augmented by radiation from the parched earth, and by this means they take a firmer grip on their moisture, float higher and carry their burdens farther to the north, or, being reinforced by the the westward winds hot and dry from the plains, their moisture is diffused in that hungry atmosphere, and the combined currents carry it to indefinite distances northeastward. Again, show him that he cannot have something out of nothing; that the highway robbery plan of taking from the forest, the field and the air all their benefits, giving nothing in exchange, is pernicious in every respect; that here, as everywhere else, "Honesty is the best policy."

"Once let the northern Illinois farmer understand that, under normal conditions, these vapor laden air currents from the south spill out their moisture in local or general showers many times along their route, passing onward to recoup their water by evaporation from the earth along their pathway, and that under the old conditions of marsh and wet lands they found plenty of it; but now, when thousands of square miles of these same lands have been ditched and drained with tile, the air goes on hungry and impoverished for lack of vapor and with no promise of refreshing showers for the waiting lands along its course. When he realizes this fact he may be led to see that perhaps it would be good policy for the state to own and control those waste places and keep them as such for the general good. And, perhaps, seeing this, he might be willing that the grand state of Illinois should take some steps to act in concert with other states in an attempt to mitigate the hot dry winds from the west by pouring into them moisture through the agency of belts of timber trees, even if the state did have to spend some money to keep the trees alive by boring a few artesian wells.

WILL IT PAY TO COOK FOOD FOR CATTLE.

This, according to the experiments of Prof. Stewart, depends upon the number to be fed. He says, as the result of his experiments, that he believes in it. He took twenty steers, placing half of them on one side of the barn and the rest on the other. To one lot he fed three bushels of corn meal per day and dry hay. To the others he gave one and a half bushels of meal, which was mixed with six bushels of cut hay, and the whole cooked until it was soft. He continued feeding in this way for three months, and found that the lot of steers fed on cooked food gained as well as the others, and when all were killed the butcher said that the meat of those fed on cooked food was better than that of the others. According to this experiment, there was a saving of one-half in the meal used. Prof. Stewart says that he has never found a gain of less than thirty per cent. in his experiments with all kinds of stock. A ration made up

of 3 pounds of fine middlings, $1\frac{1}{2}$ pounds of pea-meal, $1\frac{1}{2}$ pounds of oil-meal, and 10 pounds of cut hay, 16 pounds in all, cooked together, he found produced as much as 24 pounds of the same food fed in the same proportions, but not cooked. He cooked hay and fodder for two hours, until the fibres became soft, making thorough work of it. The expense of the work will not warrant its being done for a small number of cows, as it costs as much to cook for ten head as for thirty. He was convinced that it would not pay to cook the food for a herd of less than fifteen or twenty cows, and the larger the number, of course, the greater the saving, which he and some others have placed at full one-third in the amount of food used.

The convention adjourned to meet at 7:30 P. M. the same day.

THIRD DAY—EVENING SESSION.

The convention met pursuant to adjournment a 7:30 P. M.

The report of the committee appointed upon the question of dairy exhibit at Chicago was submitted as follows:

WHEREAS, For the best interests of the dairy in the north-west it is evident that an annual dairy exhibit should be made at Chicago, and upon as nearly a national basis as possible;

WHEREAS, The Illinois State Board of Agriculture affords the only available opportunity for such an exhibit in connection with the American Fat Stock Show;

WHEREAS, The imitation butters having usurped the agencies provided by the state for the express purpose of promoting the interests of the productive industries; and the fact that butterine and oleomargarine are not products, neither are the compounders of the same producers in the sense required by law and in harmony with the duties of the State Board of Agriculture.

Therefore, be it *Resolved*, That this, the Illinois State Dairymen's Association, in convention assembled, recommend that measures be taken in this, and a request be made that similar action be taken in other states, in view of making an exhibit of dairy products commensurate with this great American industry at the Fat Stock Show in Chicago in 1888, and thus assert our rights as legitimate producers in a leading industry;

W. R. HOSTETTER,
MILTON GEORGE,
CHAS. H. WILBUR.

The report of committee was adopted.

Music, "Medley"—Male quartette; Messrs. Cogswell, Frazer, Davis and Miles.

Reports of the committee appointed to report on creamery account books was submitted as follows:

We, your committee, beg leave to submit the following report:

The creamery account books, consisting of Fargo & Co's. Patron and Drivers Book, Creamery Register and Ledger, Andrews & Burnaps Dairy Cream Record and Cream Pay-Roll, Lespinasse's Cream Account and Patron's Book, Harrison's Creamery Ledger and Check Book, were examined, none of which we think adapted to each and every creamery, but all have their good qualities and with the above to select from we think any creamery can find such books as suit it best.

Respectfully submitted,

J. Y. SAWYER,
J. B. BERTOLET,
E. E. CHESTER.

The report was adopted.

Mr. Periam moved that a committee of three be appointed to take action with reference to making an exhibit of dairy products at the Fat Stock Show in Chicago in 1888 and call a conference of other states interested in dairymen to advise upon this matter and secure united action, which motion was carried and the following committee appointed by the chair:

Hon. Jonathan Periam, Chicago.

Hon. E. E. Chester, Champaign.

Hon. H. B. Gurler, DeKalb.

Music, "Down by the Sea"—Capt. E. T. E. Becker.

EDUCATION OF FARMERS.

JACOB GROSSMAN, Lanark:

It affords me great pleasure to have the honor of taking part in these interesting and profitable meetings.

The opportunity of hearing persons of such marked ability and culture is, indeed, a rare treat to all who have availed themselves of that privilege.

It is a pleasing thought to a humble farmer to know that there are not a few of his brother farmers that are able to represent him; not only in conventions of this kind, but also in the halls of legislation. Yet it is a deplorable fact that the farmer in general is not as well educated as the manufacturer, successful merchant, banker and railroad manager. The all-absorbing question with the average farmer is how to better his condition financially.

After three years of short crops and low prices, in many instances, the bank account has been supplemented by the much dreaded mortgage.

How to grow better crops, how to improve his live stock and sell at remunerative prices, so absorbs his mind that he forgets to look after that which is worth vastly more importance than large crops, fine stock, or fertile farm, namely, the education of himself and his family.

The storing of the mind with useful knowledge pertaining to the business of the farm is just as indispensable to the success and prosperity of the farmer as a business education is in any department of business or a professional education to a clergyman, physician or lawyer.

Has the farmer made use of the opportunities that are ever before him to educate himself as men are educated in these enterprises?

The success of the farmer is the sure measure of success for all other enterprises.

Is it not very important that he should be qualified mentally as well as physically to make his success more sure in the future than it has been in the past? Agriculture has kept pace with civilization.

Does the farmer deserve all the credit for the progress?

The inventor and mechanic deserve the gratitude of every farmer in the land for the improvement in agricultural implements used in the cultivation of the soil and harvesting its products. The agricultural press, farmers' institute, dairymen's association, are doing more practical work in one year for the

bettering of the manual and mental condition of the farmer than has been done in a decade.

Do all the farmers take or borrow agricultural papers?

Have all the farmers of northern Illinois attended this dairy-men's convention?

Am I not safe in asserting that less than one-fourth of even the farmers of Carroll county have availed themselves of the opportunity of learning in a few days, what has cost years of hard toil and mature experience?

The intelligence and ability that have characterized these meetings is indicative of better days in the near future for the farmer.

It is gratifying to know that at least one branch of agriculture can be conducted successfully by co-operation.

May we not earnestly hope that the day is not far distant when every department of agriculture in this great commonwealth will be thoroughly organized for effective and intelligent work in everything pertaining to our welfare and prosperity?

I am happy to say that in every community there are intelligent farmers that are educated, and well informed in every department of their calling.

But it is the education of the farmer in general that is demanded by the active and intense competition of the financial world.

To accomplish this we must begin with the education of the child. The adage that the child is father to the man is verified by the truths of history. We boast of the privileges our children have in the country schools. With pride we point to the many school houses in the valleys and on the hill tops.

Let us compare the privileges of the farmers' children of this county, in the ungraded or country school, with that of the graded school in the towns or cities. The same law of progress that applies to the child in the one is equally applicable to the child in the other.

Twenty years ago the teachers of the town and country

schools were paid equal wages, or at least they received the same average salary.

The present system of conducting the graded schools has raised the salary to an average of \$50.00 per month, while in the ungraded schools the average is \$30.00.

In the towns and cities, superintendents and principals are employed, who spend much of their time in supervision of the schools under their charge; also holding weekly meetings for the benefit of the teachers, giving instructions, advising, consulting and discussing matters and subjects pertaining to the betterment of the schools.

Compare this system with the one in vogue in the country schools. One or two visits per annum from the county superintendent is all that can be expected. It is an exception to hire an inexperienced teacher in the graded schools. He must be one of tact and skill, who has taught for some years with approved success before he is entrusted with so important a position.

In the country schools the directors usually employ teachers without regard to special fitness or experience. As there are usually about five or six applicants for each school it is an easy matter to employ a teacher at low wages, the lowest one usually getting the position, dwarfing some of the opportunities that would result beneficially to the school.

Out of 36 teachers employed in the graded schools 23 hold first grade certificates. Out of 104 teachers in the country schools 10 hold first grade certificates.

The charity of this manner of hiring teachers is the only commendable feature. The country school seems to be the favorite place for teachers to learn to teach. In addition to all this the graded schools are well supplied with libraries and apparatus for imparting instruction in the easiest possible manner. The libraries of the graded schools contain 1,500 volumes, one for each pupil. Those of the ungraded contain but 100, one volume for every 28 pupils, or rather 28 pupils for one small volume.

These existing disadvantages must be removed before the ungraded schools can stand on an equality with the graded.

With the comparative and statistical difference it seems almost impossible to believe that 75 per cent. of all the great and noted men of the present century have come from the farmers. This is now a matter of history.

With such facts before us what are the possible accomplishments of our boys and girls if their opportunities are on an equality with the pupils of the graded schools. It does seem that the warm sunshine of the summer, and the cold winds of winter coupled with hard toil, have given to the farm laborer a strong body and a determined will, to accomplish almost whatever he desires.

With this great physical development on the one hand, and the advantage of a good school on the other, we would make strides in progress that no other class has ever done. It is not advocated in this paper that it is essential to pay the teachers of the country schools the average wages of the graded schools to secure an ordinary country school education. But I do advocate township organization by legislation. Until this is done directors of the several townships should hold meetings and adopt a uniform system of wages discriminating in favor of experienced teachers holding first grade certificates—thereby securing a larger per cent. of teachers that are competent and qualified to teach the sciences to the advanced pupils.

As much of our culture, our knowledge of right and wrong, of what is proper and improper, comes from our reading, it is in place, and our duty, to see that our pupils in school and our children at home are furnished with at least small libraries.

The child naturally loves to read, and will spend hour after hour poring over some interesting story book or biography. If we furnish him with the right kind of books it will develop in his young mind a thirst for knowledge.

The reading of good books will not only make the children wiser, but also keep them out of much evil, and make them happier and better throughout their whole lives.

Can a parent or patron find any work more important or more blessed than this? Is it not worthy of thought and time? No study is so useful in the formation of character as reading. In books children see great and noble deeds being done by beings like themselves; and they cannot resist the desire to do like deeds. This cultivates the will, forms character, makes men.

Music, "I Fear No Foe"—J. G. Lumbard.

CREAM SEPARATORS.

BY D. T. SHARPLESS, Philadelphia, Pa.:

Mr. President, Ladies and Gentlemen of the Association:

The history of the centrifugal process of skimming milk has been written by abler pens than mine, but at the request of your president I have jotted down a few points in regard to the beginning of this process of skimming, and further shall endeavor to give some good reasons why no creamery man handling whole milk can afford to use any system of setting and skimming by hand, and right here let me say that in my opinion the whole milk system is the only true system for creameries in close competition to pursue. About fifteen years ago the first experiments were made in Germany to determine if it were possible to separate cream from milk by the centrifugal process. It is a well known fact that the specific gravity of milk is slightly greater than that of cream, and it is also well known that it is this difference in specific gravity that causes cream to rise on milk when set in any ordinary way. By the centrifugal process this difference is increased a thousand-fold, and the cream rises just that much quicker.

The first device for this experiment was two vessels suspended on either end of an arm that was made to revolve longitudinally at a high rate of speed. The milk was placed in these two vessels and the machine set in motion until the proper speed was attained, when it was allowed to stop gradually and the separation was found to be complete.

This simple experiment proved the correctness of the theory of separating milk from cream by centrifugal force.

Soon after German investigators constructed a vessel to revolve upon its own vertical axis, in which the milk to be separated was placed. This machine was set in motion, and again when the proper speed was attained the separation was found to be complete. When the separator came to rest a fresh supply of milk was placed in it and the operation repeated.

The difficulty connected with this machine was that with each lot of a few hundred pounds of milk the machine had to be stopped and started, thus occupying much valuable time.

The problem which now presented itself was to construct a device or attachment to this separator by which a constant supply of new milk could be run into it and the separated products be removed without injury while the machine was in motion. Many plans were used and attachments tried, but none were entirely successful until Dr. De Laval, of Stockholm, Sweden, conceived the idea of attaching a pipe directly to the separator that would revolve with the bowl, and at the same time carry off the skim milk as fast as it was produced.

A much more difficult problem was the discharging of the cream in such a manner that it would not be injured. This has been accomplished in but one separator as yet. In the machine I refer to the cream is allowed to flow over the edge of the separating bowl in a very fine stream; the air acts as a cushion upon this stream and brings it to a gradual standstill, when it is caught in a pan especially adapted for the purpose.

About the same time that Dr. De Laval was making his investigations, a firm in Denmark were also experimenting upon the line of *skimming* the milk and cream from the separator by means of sharp-pointed tubes, so arranged as to take up the products of separation from the inner periphery of the moving bowl. These experiments were further continued by Mr. Weston, of Boston, Mass., and the outcome was the present Danish-Weston centrifuge or separator as it known in this country.

Why should the separator system be used in preference to any other for securing the cream?

The first great advantage claimed for the centrifugal process is the increased yield of butter secured. Careful experiments have been made, more particularly in Sweden, Denmark and Germany, with regard to this point, which prove that an increased yield of from ten to twenty-five per cent is realized over any other process. To creamerymen who are handling from 5,000 to 25,000 pounds of milk per day, this means the difference between profit and loss in the conducting of their factories. In addition to this gain in *quantity* the superior *quality* has come to be acknowledged in the best markets of the country, and to-day your secretary read a list of premiums awarded to butter on exhibition at this meeting, and the first premium for best butter made in the state of Illinois, at a whole milk creamery, was awarded to butter made from cream separated by one of Dr. De Laval's separators. As a further proof of the superior long-keeping qualities of butter made by this process, I would say that the first premium for June made butter was awarded at the Fat Stock Show at Chicago to J. Colvin, of Kingston, Ill., a user of separators. Also nearly all the fancy butter that brings the fancy prices of 75 cents to \$1.00 per pound is made from separated cream.

Again, in regard to the value of the skim milk from the separator for feeding purposes, as compared with the stale, sour milk of the setting system, we have the authority of Miller & Sibley, one, if not the largest of the firms of breeders of Jersey cattle in this country, to sustain us in saying that the fresh, sweet milk from the separator is worth fifty per cent. of the whole milk for raising calves. Not that it contains fifty per cent of the nutriment of whole milk, but that with a slight addition of nitrogenous matter in the shape of oatmeal and bran, it furnishes a perfect ration for the growing calf. Prof. Henry, of the Wisconsin experimental station, also adds his testimony as to the value of sweet skim milk for feeding hogs. In one of his bulletins he says that in no case has he found it worth less than twenty-five

cents per hundred pounds, and in some cases as high as forty cents. These differences were caused by the different methods of feeding it.

Again, the separator has been introduced in several sections of the country where the cream gathering plan is in vogue. The plan is as follows: The proprietors of a central factory establish separating stations at points convenient for their stations to deliver milk. The skim milk is taken back in the same cans that the whole milk was brought in. The cream gatherers from the main factory collect the cream from the various stations every day in a much fresher condition than could possibly be attained by any other process.

To private dairymen handling the milk of from twenty to fifty cows, the separator system presents many advantages. It enables him to handle his milk and cream with much less labor, securing a much larger yield of butter, and making his skim milk of double the ordinary value of skim milk. Having but the cream to take care of after the separation has taken place, he requires less can or vat room to hold his cream for ripening, and it enables him to churn twenty-four hours earlier than he could if he had to wait for the cream to rise by the natural process. In this way he avoids many of the dangers from contamination by atmospheric and other impurities.

Within the past few months a new device has been placed upon the market known as the turbine separator. The machine is operated by steam direct from the boiler, no engine or power of any kind being necessary. Hand power separators, in a variety of forms, also are making their appearance, enabling the small dairymen to compete with the creamery in making fine butter without the outlay of a large sum of money. This is essentially an age of improvement, and the dairyman or factoryman must keep up with the procession by adopting these new processes and inventions, or be left entirely out of the race. The best is none too good for our people, and the dairy products of this country must improve in quality to meet the demand for

fine goods. Butter is sold on its merits in the market, and he who makes the best will be the successful dairyman.

Yours respectfully,

D. T. SHARPLESS.

PRESENTATION OF SPECIAL PRIZES.

The Secretary: "Ladies and Gentlemen, Members of the Association: One of the highest privileges which has fallen to my lot during this week, one of the greatest pleasures which I have kept in reserve, was that of presenting in the name of the exhibitors at the American Dairy Show a token of appreciation of the efforts of our young in bringing themselves to the front in this great dairy work. I am here to say to you, and I am proud, and at the same time I believe the dairymen of Illinois will feel proud with me, that the scoring upon the Dairymaids' Class of 1887 is such that it will be a matter of great attention and nicety of details for the dairymaids of the following years to equal it. The score of the first premium of the Dairymaids' Class is a score that many of our best dairymen have been trying to attain, and a score that a great many have not attained; and it is so much better and so much an occasion of congratulation and encouragement to us that the young ladies who entered in that class are all below the twenties. Mr. Bailey, will you present to your niece, in the name of the Illinois State Dairymen's Association, this watch, and with it this list of the friends of the Dairy, who present it to her?"

Mr. Bailey. "I will accept it with many thanks in her behalf."

The Secretary. "Mr. Hostetter, the people of Mount Carroll have not been backward in taking a hand in this show of the Illinois State Dairymen's Association, and Messrs. McKenney Brothers have offered a set of knives and forks for the best pail of butter made in Carroll county. I am happy to say that it falls to the lot of one of our tried and trusted dairymen, yourself, with a score of ninety-two points."

W. R. Hostetter. "I will say to the citizens of Mount Carroll and vicinity that the tub of butter that took this prize will be in the postoffice to-morrow with a package of crackers and these knives, and you are all invited to take a lunch."

Vocal duet, "Venetian Gondola," Misses Hostetter and Mackay.

The President: "We have been in session here several days and we have but a few minutes left, but we would like to hear from some of our friends in those few minutes and have a sort of experience meeting. Some of you did not hear Prof. Lazenby, of the Experimental Station at Columbus, Ohio, in his talk to-day. We would be glad to hear a few words from him. Tell us a story, Professor."

Prof. Lazenby: "I am a very poor story teller, but I am perfectly willing to express my pleasure and appreciation in visiting this part of the state of Illinois. It is possible that many of us have not learned in this meeting a great many things that are entirely new, but I believe that we have all received a sort of awakening, a stimulus to renewed effort, that will do us a great amount of good. You all know that in this age and day the social effect of all institutions is one of the most powerful. We know that the churches, where they have kitchens and a good deal of sociability, are the most lively ones, and in any institution, no matter how zealous and earnest the work may be, if they lack this element of sociability they are sure to lose ground.

Now, I repeat again that it affords me very much pleasure to meet here the citizens of this part of the state of Illinois. I am originally from New York state, myself; I was not born in Ohio. It is said that some men are born great, and others are born in Ohio; I was not born in Ohio, but I moved there just as soon as I could, and I call myself a very good Buckeye now.

I want to say this: Next year, as some of you are aware, we celebrate in Ohio our first centennial. It is one hundred years since Ohio was first proclaimed as a territory, and preparations are being made now for a very grand celebration there. This celebration is to be held at Columbus; I believe there is to

be a sort of a side show at Cincinnati, but our people of Columbus don't think very much of what is going on at Cincinnati. I can tell you, however, that beginning about September 6th next year, and continuing until about October 20th, we expect to celebrate a grand centennial; we expect to have a grand exhibition showing the agriculture and horticulture of the state, and I presume there will be a fine display of dairy products. There is to be one week set aside as a sort of a military week, one week devoted to education, and one more week is to be devoted to agriculture and horticulture. In closing I will simply extend to you a very earnest invitation to visit Columbus at that time especially, if you can't do it before, and we will see that you have a good time."

Mr. E. E. Chester was next called upon by the president, and responded as follows:

Mr. E. E. Chester: "*Mr. President, Ladies and Gentlemen:* I regret very much that any member of the much persecuted State Board of Agriculture has to appear before you to say a word in its behalf, and I assure you that there is one question I shall not attempt to say anything upon, and that is the butterine question. Some thirty odd years ago, as you all know, there was organized what is known now as the Illinois State Board of Agriculture, and that Board, as you know, has held an annual fair in the state of Illinois, with what success you are all well acquainted. Some eleven years ago it came into the mind of a gentleman whose name is a household word in Illinois, that the State Board of Agriculture was not doing all it might do towards advancing the interests of agriculture in the state of Illinois. He addressed a letter to the then President of the State Board of Agriculture, outlining a plan by which additional work and additional advantages might be brought to the agriculturalists of Illinois. That gentleman is Prof. Morrow, of Champaign, who has the honor of being at least the father of the Fat Stock Show. This exhibit was organized ten years ago under very difficult circumstances, and it is an absolute fact that to make a creditable show in the first Fat Stock Show it was a necessity to go

down to the stock yards and have a lot of hogs brought up and put into the show to keep up appearances. Well, from that small beginning, beginning, too, without any means, without any appropriation, without any funds in the treasury to back this thing up with, you know something of the dimensions to-day to which this show has come. You know that just a few weeks ago we closed one of the finest stock shows that has ever been held in America; the horse show was certainly one of the grandest that ever was held on this continent.

Some four years ago it struck an individual member of the board that, now, a great deal of work had been done towards advancing certain interests; that there were interests that had been neglected, and one of the neglected interests was the dairy interest of Illinois, and when the subject was presented to the board it brought great astonishment when it was discovered that the milk product of the cow in the state of Illinois was bringing more money into the pockets of the people of Illinois than the beef product, and the members of the board looked with astonishment when these figures came before them, and many absolutely denied them and demanded proof, but the proof was forthcoming in statistics and they finally cheerfully admitted that the milk product of the cows of Illinois was a more valuable product to the people than the beef product, bringing in more money year by year. After conceiving this idea they decided that it was possible for them to do something towards advancing the dairy interests of Illinois; to be sure dairy cattle had been shown, the Northwestern Dairymen's Association had been permitted to make an exhibit, but nothing else had ever been done towards advancing this great interest of Illinois. In the course of time this idea was matured and three years ago the board announced a premium list, backed it up with an abundance of money and held what was known as the first dairy show, under the auspices of the Illinois State Board of Agriculture, and that was, I assure you, a very large exhibit. A gentleman who has been familiar with dairy shows on this continent for the last fifteen years assured me that it was the

largest exhibit of dairy implements and dairy products that ever had been held west of the Alleghany mountains, which I thought was pretty good for the beginning.

That show encouraged our board to continue and they held another show last year. To the observing public that show was not a representative show of the dairy interest, and yet it better represented the dairy interest of Illinois than the first show. It was discovered in the first show that the exhibits were too large, we demanded that they bring too many packages to represent an exhibit, and as we had unfavorable weather all the week, there was a large per cent. lost to the exhibitors in the value of their goods, and we decided to make the exhibit a smaller one in one respect, that a single package might represent any factory, creamery or dairy, and then the dairymen of Illinois could come there and examine the product after they had been scored and compare with other products; the student of dairying could go there and study the samples, but I am sorry to say that I have been very much astonished and disappointed that the dairymen of Illinois, among whom I have a very large acquaintance, and the magnitude of whose interests we fully appreciate, I am sorry to say that they almost let the show of 1887 fall to the ground, not because there was not money enough in it, for one of your own citizens told me that he received more than one hundred dollars on a prize on one single twenty-five pound package. A citizen of a neighboring county last year received nearly four hundred dollars upon one sixty pound package at the second show. If these are not encouragements for you to come out I don't know what we can devise, for I want you to understand definitely that the Illinois State Board of Agriculture are not millionaires; their members work for nothing, without any salary, and their treasury, I assure you, is not in a condition to enlarge these premiums; but when hundreds of dollars fall upon one single tub, any of you that ever invested in a lottery might take the chance that a lot would fall upon you.

Quintet, "We Never Will Mortgage The Farm"—Mrs. N.

M. Davis, Misses Melendy and Becker and Messrs. Becker and Frazer.

MODERN DAIRYING.

BY F. S. BURCH, *Dairy World*, Chicago:

Our worthy secretary assigned me the task of writing a paper on "Modern Dairying," and I suppose the orthodox way would be to launch out in a torrent of praise of old fashioned dairying—of the mythical dairymaid whose face was her fortune; of the picturesque old dash churn which was used 2,000 years ago; of the old brindle cow, with her mild eyes, and gentle ways. Or, perhaps I should go still further back and give you a word picture of the Arab on his camel plodding along through the desert, while the soft rays of the setting sun played gently with the leather bag in which the camel's milk was transformed into butter. Yes, I might go on and tell you how deeply I regretted poetic dairying was a thing of the past if I had not been there myself; if I had not tired my arms pounding away with that old dash churn; if I had not learned by experience that the gentle cow *might* kick; that the poetic dairymaid of the past was just as apt to give a fellow the mitten as those of 1887.

Modern dairying means creameries and cheese factories wherever the farmers have not the conveniences or inclinations to make butter or cheese themselves.

Modern dairying means labor-saving machinery and business system on the farm.

Modern dairying means more schools, more churches, and a higher state of civilization.

Modern dairying means better butter, more butter and less work.

But it will not do to rest on our oars and lose ourselves in self-admiration. There are many weak points in our modern dairying, and I wish to call your attention to a few of them. I have always regretted the lack of true co-operation between the creamery owner, the cheese factory owner and their patrons. There appears to be a general inclination among the patrons to think the factory men are cheats.

On the other hand, the factory men seem to think the patrons are either watering or skimming their milk.

Now, my opinion is, that this nonsense about any *special* honesty among the farmers is, or ought to be exploded, as you will find a certain percentage of honest and dishonest men in every walk of life; and while the farmers contain no *larger* per cent. of honest men than any other class the cheese factory men and creamery men contain no larger per cent. of *dishonest* men than the farmers. But the fact remains that this distrust is *there*, and it stunts the growth of dairying just as badly as the northwest blizzard stunts the orchards of Dakota.

It may be claimed that the solution of this difficulty will be the formation of co-operative factories in the strictest sense of the word, *but*, will the farmer who would water his milk be *less* inclined to cheat his *fellow farmers*? and will the unwieldy management of a committee of three or five be apt to be more honest than that of the present factory man? I fear not. And yet I am inclined to believe that our way out of the woods is through a return to the *strictly co-operative system*. Till then the farmers will hardly learn that the success of the factory man is identical with their own.

Another weak point is, that the factory men are inclined to secure the services of the cheapest butter or cheese makers they can find, and also to allow him too little help, so that he never finds time to study or profit by the many new methods and improvements that are being followed or adopted elsewhere. You must not think that while I point to a few rents in the radiant garment of our modern dairying I am not alive to the enormous improvements we have made in the last decade, but I feel sure that a dozen years ahead we shall look back with a pitying smile on our present idea of modern dairying.

I fancy I can see far enough in the future to promise you we shall have dairy experimental stations with well equipped laboratories.

I can promise you that we shall have dairy schools where farmers sons and daughters may receive instruction in modern methods of butter and cheese making.

I can promise you many reforms in our methods of transportation, and in our present unsatisfactory manner of marketing products through the commission stores where we find decaying vegetables, tired eggs and limburger cheese in peaceful proximity to our golden butter.

I fancy I can already see millions of consumers who do not mistake "commencing rancidity" for "high flavor," who do not want their butter loaded with buttermilk or stuffed with salt.

And finally, I fancy I can actually see dairy papers running on an independent and paying basis, supported by paying subscribers; dairy editors that will not be afraid of telling the truth for fear of losing an advertisement, but working solely in the interest of liberal paying subscribers.

Is all this visionary? I hope not, it need not be if we will each of us delegate ourselves a committee of one to work in harmony with everyone else that follows dairying for a livelihood; if we all place our shoulders to the wheel and see that the term modern dairying be, *always moving*, and *always progressing*.

Yours respectfully,

F. S. BURCH.

The committee on resolutions made the following report, which was adopted by the convention:

WHEREAS, The present convention of the Illinois State Dairymen's Association has been at once the most advantageous and enjoyable of any during the fourteen years of its existence, and inasmuch as this success has been largely due to the zeal, cordiality and pronounced hospitality of the citizens of Mount Carroll, be it therefore

Resolved, That the thanks of this association are due, and are hereby tendered to the Hon. John Miller, mayor of the city, for his very able, interesting and instructive address of welcome, with which the proceedings of the convention were inaugurated.

Resolved, That to the Rev. Dr. Gelwicks for his able participation in the opening proceedings of the convention; and to the several local committees, which have in the most ample and

admirable manner, supplied to the convention, audience room for its sessions, store rooms for its exhibits, music for its entertainment, hotel accommodations for its members, and in every way made provision for the comfort, convenience and pleasure of its delegates and strangers in attendance, the appreciation and gratitude of this association are hereby extended.

Resolved, That to Mrs. B. F. Hazen, and the young ladies assisting, the convention is indebted for the artistic rendering of several selections of music, by which the audience was entertained and delighted; and in this convention we desire to emphasize our appreciation and admiration of the phenomenal voice and graceful performance of the child songstress, Miss Fern Frazer, as also to the fine quintet under the direction of Capt. Becker.

Resolved, That to the several railroads which have extended the courtesy and favor of reduced fare to and from this convention, the thanks of this association are extended.

Resolved, That in the public press, to the powerful influence of which much of our present success is due we recognize the universal teacher, the ablest educator of the masses the lever of moral and material achievement, and the herald and help of an ever advancing civilization; and to the local press of Mt. Carroll, the agricultural and dairy press, and the country newspapers of Illinois, whose energies have been freely spent in the advancement of those interests and industries which we strive to uphold and promote, the hearty thanks of this association are most cordially extended.

All of which is respectfully submitted.

J. G. LUMBARD, Chairman,
G. H. MONRAD,
D. W. WILLSON,
JOHN BOYD,
N. E. DILLIE.

The Secretary: "I would desire to add to this report of the committee on resolutions the following: 'This association returns most heartfelt and sincere thanks to these gentlemen who have taken such an interest in this meeting of the association as

to offer freely and voluntarily all those valuable things which have constituted our premium list, and enabled us to hold a butter exhibit of the Illinois State Dairymen's Association this year.'"

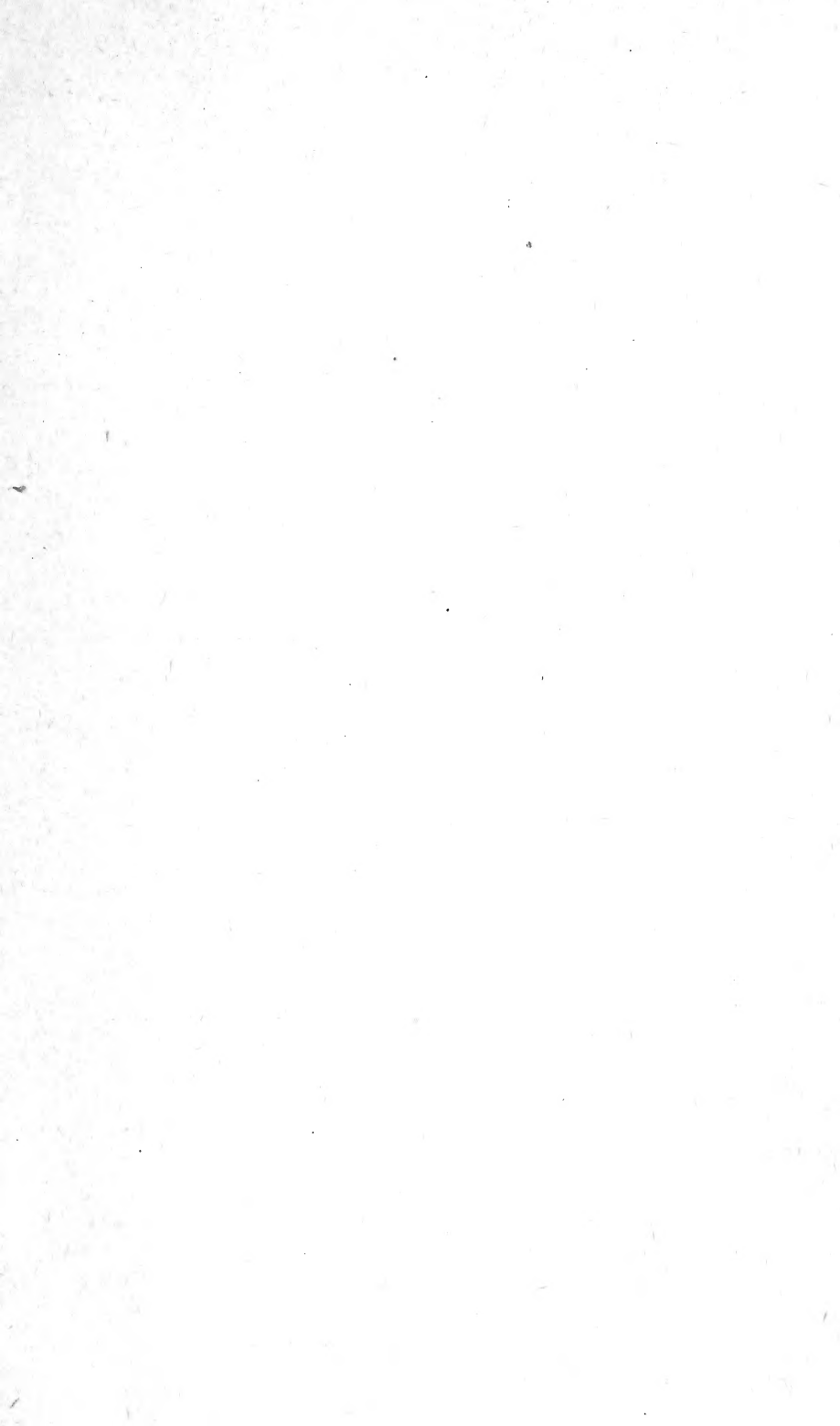
It was moved that the resolution offered by the secretary be inserted with the others and included in the report. The motion was seconded and carried.

The President: "You have noticed all through this association, ladies and gentlemen, that there has been a constant contest between the worthy secretary and myself as to who should have the biggest words, and the most words, and the last word. Now, I wish to show my appreciation of the secretary and besides that I wish to gain his favor, and I will do that by yielding to him and letting him have the last word."

The Secretary: "*Ladies and Gentlemen:* Our president has certainly placed me in rather an awkward situation for a modest, humble man. While I confess I have got a meek and agreeable lady, the privilege of the last word is one that I have not enjoyed for a long time, or even tried to encompass, having never had an occasion to find any use for such a thing within a decade of married life. Ladies and gentlemen, we bid you farewell to-night; farewell to meet again, we hope, upon our chosen paths of life, but to some of you, perhaps, we now say farewell to whom it will never be our privilege to give greeting again during the course of our natural life, for we little know what moment we may be called to answer at another bar, another tribunal than a mundane one. In extending to you the heartfelt thanks of the officers of this association and of its members, I wish to express our appreciation of the kind reception and feelings with which we have met in every part of your beautiful city, and I wish to say to you, for a last impression to-night, that of all the places where we have met, all the places we have been to for the last fourteen years, carrying along this banner of successful dairying we have never been received at any place with a more enthusiastic and admirable reception than we have at Mount Carroll.

Music, chorus, "Auld Lang Syne."

The convention adjourned *sine die*.



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